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Vol. 8
No. 5

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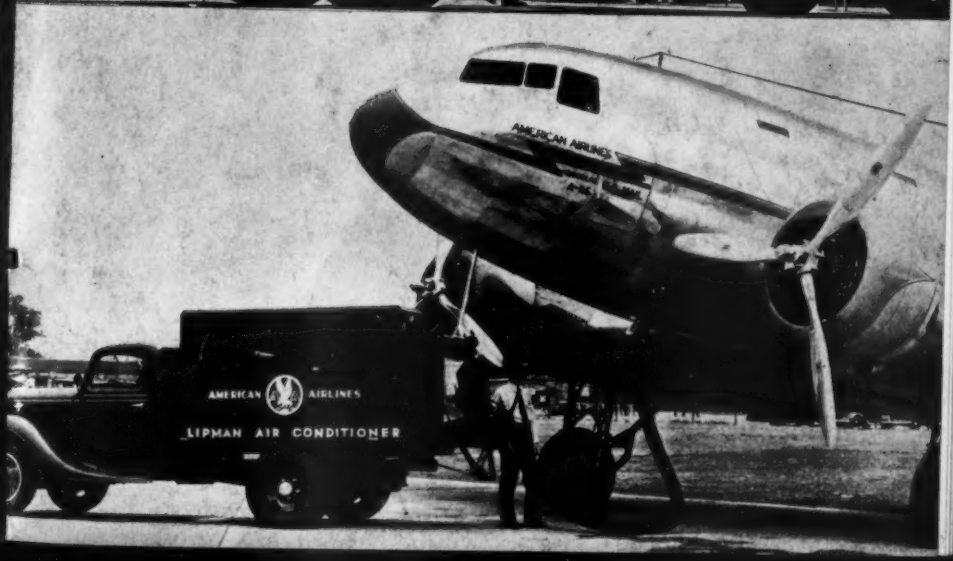

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The Refrigeration Service Engineer

Vol. 8 No. 5

May, 1940

A Monthly Illustrated Journal Devoted to the Interests of the Refrigeration Service Engineer in the Servicing of Domestic and Small Commercial Refrigeration Systems and Oil Burners

Official Organ
REFRIGERATION SERVICE ENGINEERS SOCIETY

Cover

This month's front cover illustrates the article appearing on page 20 entitled "Portable Airplane Air Conditioners Powered by Gasoline Engines."

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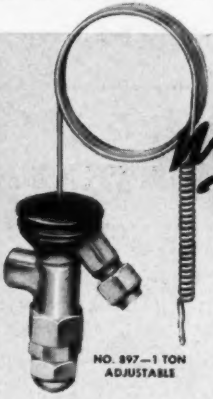

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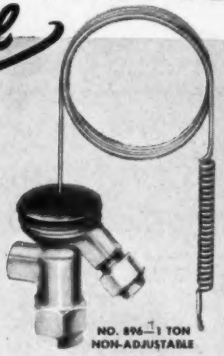

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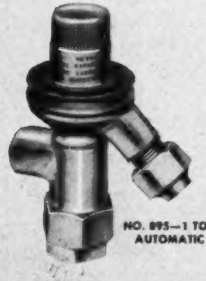

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The Refrigeration Service Engineer

Vol. 8, No. 5 CHICAGO, MAY, 1940 $2.00 per Annum

Modern Dehydration*

Dehydration is always an important refrigeration topic. This article describes the Thawzone method now currently in use.

THIS paper is written for the practical refrigeration man who is faced with real problems in field and factory. While it covers principally the moisture problem in refrigerating systems, it touches on other related chemical matters which we feel should be covered in a paper of this type.

Refrigeration systems are complex mechanically, but their mechanical features are now, in general, well understood. Less well understood is the equally complex chemistry involved in the modern light-weight, high-speed sealed machines, using the new refrigerants. It is our thought that much of the information already available along these lines is not in a form which makes it easy to apply to real problems.

At the beginning of our research, we set up a specification, and our development work was directed toward a liquid dehydrant with these properties:

1. A liquid—for ease and economy of use.
2. Soluble in refrigerant—to insure circulation so it would reach all parts of system.
3. Soluble to some extent in oil—to reach any moisture there.
4. Sufficiently stable in contact with refrigerants and oil.
5. Capable of dissolving ice quickly so that a frozen system could be quickly put back into operation.
6. A true chemical dehydrating agent—so that immediately the water or ice was put into solution, it would react with it, forming other compounds which would be harmless.
7. Sufficiently volatile to insure against being trapped out in the crankcase or low-side; i. e. ability to travel with the vapor phase of the refrigerant.
8. Non-corrosive when mixed with refrigerant to the usual materials of construction.
9. Acid-neutralizing—i. e. ability to overcome organic or inorganic acids that may form in a system for various reasons.
10. A material, which, if added to new units, would prevent copper-plating.

The research undertaken with this goal in mind resulted in the product now known as Thawzone.

The active dehydrating material in Thawzone consists of a blend of two organic chemicals. The two were selected after tests

* From copyrighted bulletin by Highside Chemicals Co.

which determined that in suitable proportions the combination had approximately the right reactivity.

Tests have shown Thawzone is needed in only small proportions, approximately one per cent of the weight of the refrigerant in a system, and when it has reacted with water or acid, it thus leaves the refrigerant substantially pure. The small amounts of reaction products that form, appear, as explained above, harmless and innocuous. Acid is reacted with in a similar way. The important point is that water (and acid) which are detrimental have been removed, leaving only small amounts of non-corrosive compounds.

To illustrate the practical advantages of Thawzone we show in Fig. 1 a valve plate taken from a ½ h.p. condensing unit which has been operating with Freon, .08 per cent moisture and one per cent Thawzone for 17 months. For comparison, we have a valve plate from a machine which operated for 8 months with the same amount of water but no Thawzone. This illustrates the striking effectiveness of Thawzone in keeping the working parts of the machine clean and free from corrosion. These results are typical of what was obtained in the many field tests that have been made. Thawzone was tested in this way in 8 methyl and Freon systems of various sizes for about 9 months before it was released to the field in a very limited way in 1937. After another 8 to 9 months of testing in over 80 different units, Thawzone was released commercially in the early spring of 1938.

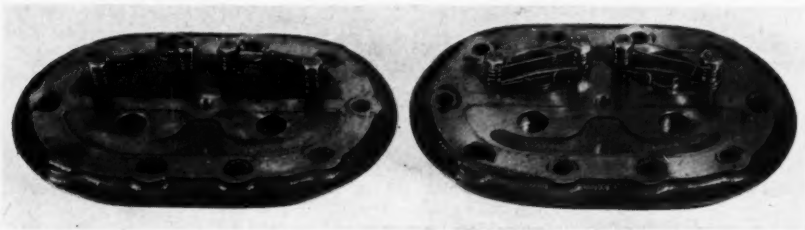


Fig. 1—Comparison showing prevention of corrosion on valve plates due to use of Thawzone. Plate at left had eight months service with .03 per cent water. Plate at right—17 months service with .03 per cent water and one per cent Thawzone.

Field Application

First, let us try to define the field of use. It is important that the service engineer appreciate the limitations of Thawzone, as well as its obvious merits. It is no miracle fluid. Once severe corrosion has taken place it will not magically remove this corrosion and restore a machine to its original condition. It will not correct valve leaks or seal leaks once they have occurred. It will not mysteriously "uncopperplate" a unit already covered with plating. In short, it will do nothing that cannot be expected on the basis of sound chemistry and common sense.

It is, however, useful in various types of refrigerating problems. When added initially it will markedly reduce subsequent corrosion. In almost every case it will entirely prevent copper plating if added to a new system. On very wet jobs if enough Thawzone is added, the job will stay in operation and further corrosion, if any, will take place only slowly. However, in a unit that contains one per cent water, (one per cent water means about one cubic inch in four lbs. of refrigerant), 5 to 10 per cent Thawzone would be required to control it. Such amounts of fluid dehydrant in a refrigeration system are not in accordance with good engineering practice and other methods should be employed. The best one is to prevent the entrance of any such large quantity of water in the first place.

Thawzone will overcome all the occasional and accidental amounts of water that are present in a carefully installed and serviced refrigeration system. It will put back into operation jobs with frozen expansion valves.

Handling—General

Thawzone, like any good dehydrating agent, must be kept sealed. If containers are allowed to remain open, it will absorb moisture from the air and deteriorate chemically. Original containers should not be allowed to remain open when measuring out a quantity for use any longer than absolutely necessary. Decomposition resulting from exposure is accompanied by evaporation.

When it has deteriorated, loss of solvent may allow some of the deteriorated material to appear as solids. Any such deposit on the outside of the containers should be wiped off so there is no chance of it being accidentally added to a system.

Containers

As supplied, Thawzone comes in special tins and in glass. Ordinary closures employing foil, cork, rubber or paper do not remain tight and may contaminate the contents. It should, therefore, be stored only in the original containers and kept in a moderately cool atmosphere, away from radiators and strong sunlight.

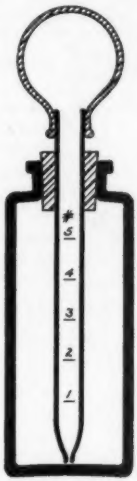


Fig. 2—Dropper bottle for shop and field use.

Special Service Containers

Purchase in large containers is economical but it is awkward to use large containers in the field or shop. It is difficult also to measure accurately from large containers. For shop use, where a small bottle can be kept on the shelf in an upright position so that the Thawzone will not contact the cork, the following is recommended. Obtain a small bottle—not over four ounces—fitted with a calibrated glass dropper tube, a rubber stopper and a rubber bulb. Such a bottle is shown in Fig. 2. The tube can be calibrated in cubic centimeters, or better, in units of 4 cc. or ⅛ ounce which is equivalent to one pound of refrigerant. In the shop, small amounts can be transferred to this bottle, while the main volume remains tightly sealed in its original container. The graduated dropper tube is used to apply the Thawzone to the equipment.

For field service work, this same bottle can be used. It should, however, be transported empty to avoid the action of the rubber cork and bulb on the Thawzone. On the job, the dropper tube can be used as a measure. The bottle then merely serves as a protection for the tube, to keep it clean and dry. Such a bottle and tube may be cleaned occasionally by washing in water, after which they should be thoroughly dried.

In open air, and especially when exposed to light, Thawzone in time decomposes, and the resulting products may be corrosive to some metals. This fact has resulted in some confusion, and it should be pointed out the action inside a system should not be judged from this. Where special service gadgets are used to apply Thawzone, steel is the recommended material of construction. Copper tubing can be used, although the effect of copper on Thawzone in the open is to accelerate its decomposition. However, in-

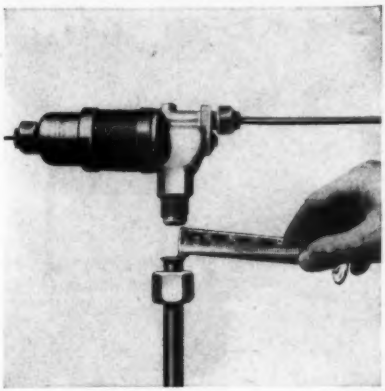


Fig. 3—Adding Thawzone to evaporator.

side a unit, *away from light*, it is not subject to such effects, even though some air may be present and all the usual materials of construction are not in any way affected.

Thorough and immediate washing with water will remove Thawzone spilled on hands or clothes. Attention is also called to the notice on the containers that, like most chemicals, it is an internal poison. Three years of use have shown this hazard to be negligible.

Methods of Applying in the Field

In making additions of anything to a refrigerating system, the important thing is to add only the desired material, be it oil, gas or Thawzone, and nothing else, i. e., no air, moisture or dirt. The following methods of applying have been used by us and appear sound from an engineering viewpoint.

(a) Addition to Suction Line—The liquid line valve should be closed, test gages connected and the unit pumped down, say, to three lbs. pressure. The joint at the expansion valve should be carefully dried and the flare connection opened. Thawzone should be measured using the dropper bottle (Fig. 2) or a graduate and applied into the evaporator as shown in Fig. 3. A little may be placed in the expansion valve if it is still frozen. The joint is quickly tightened again before the air can enter and the unit put back into operation. The Thawzone will circulate through the system soon enough to prevent further freeze-ups. The chief merit of this method is that it requires no special tools.

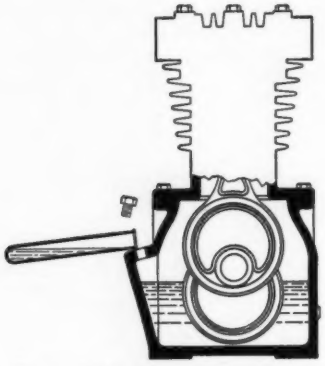


Fig. 4—Adding Thawzone to crankcase.

(b) Addition to Crankcase—This method is the same as the first except that after the job is pumped down, the oil plug in the crankcase is removed and the Thawzone quickly added at this point. This method is not recommended in cases of severe freeze-ups as it may take too long for the Thawzone to get into circulation. See Fig. 4. It is convenient for new installations.

(c) Addition to Liquid Line—Sometimes it is advisable to add Thawzone directly to the liquid line, for example, where a unit has multiple evaporators and where the circulation of refrigerant is relatively slow. After the unit is pumped down to about two to three pounds pressure, a liquid line flare joint can be opened. In order to get it into the usual small bore (¼ inch) liquid line, it will be found necessary to open another flare connection. This allows the gas in the line to escape at another point as the Thawzone runs in. It is hard to apply it this way without getting air into the system and the method is not particularly recommended.

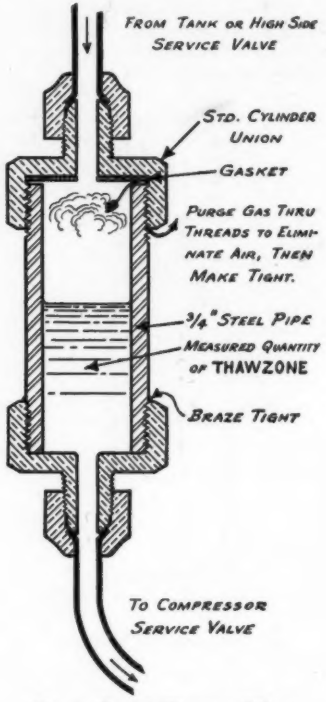

From Tank or High Side Service Valve
Std. Cylinder Union
Gasket
Purge Gas Thru Threads to Eliminate Air, Then Make Tight.
¾" Steel Pipe
Measured Quantity of THAWZONE
Braze Tight
To Compressor Service Valve

Fig. 5—Special Thawzone fitting.

(d) Application via Standard Service Test Gage Manifold—A standard service gage manifold outfit can be used to apply Thawzone as shown in the May, 1939, issue of The Refrigeration Service Engineer. The gage unit is connected to the high and low side service connections on the compressor head and purged. The suction service valve is closed against the suction line and a slight vacuum is pumped on the crankcase. A short length of tubing is fitted to the purge opening of the test fitting. Thaw-

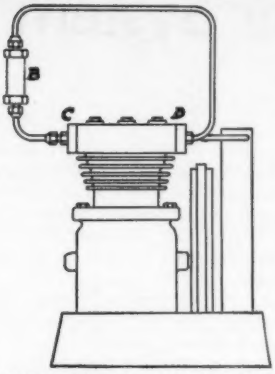


Fig. 6—Adding Thawzone with the special fitting.

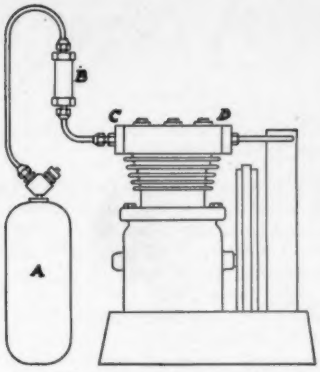


Fig. 7—Using the special fitting when adding refrigerant.

zone, slightly in excess of what is needed, is placed in a test tube and the suction test unit valve is cracked allowing it to be sucked up into the test fitting. The short tube is then removed and the purge opening capped. The high pressure connection is then opened so that all the Thawzone is forced over into the low side. Service valves are then put back into operating condition and the test outfit removed. This method, which takes a little more time, insures that no air enters the system.

(e) Special Fitting for Thawzone Application—A somewhat simpler method of applying uses a fitting of the kind shown in Fig. 5. It is not necessary to use gages, stop or pump down the unit. To introduce Thawzone into the low side, this unit is connected to the high side and low side service valves of the compressor as shown in Fig. 6. The cap is removed and the proper amount of Thawzone is placed in the device. The cap is replaced but not tightened and the high side service valve "D" is opened purging the line of air. The cap is then closed tightly. The low side service valve is opened and the pressure then forces the Thawzone into the system. The service valves are then put back into operating condition and the fitting removed.

If refrigerant is to be added, Thawzone should be added too, and the hookup shown in Fig. 7 may be used. It is important that the pressure in the auxiliary cylinder be higher than the pressure in the machine, otherwise the Thawzone will be forced back into the cylinder instead of going into the compressor. The method is obviously similar to that just described, except that the suction service valve will have to be closed against the suction line if any amount of refrigerant is to be pumped in. It is possible that, in order to be safe, this procedure should be used only in putting Thawzone into the low side, in which case the ordinary cylinder pressure is sure to be high enough.

(To be continued in June)

Cleaning Fittings Removing Gaskets

By CHARLES F. NICHOLS
Watertown, N. Y.

AN ordinary pipe cleaner makes a good tool for cleaning out fittings carried in the tool kit. These fittings, used in making service connections, will always have a film of oil which will collect dirt. They should be cleaned each time before connecting to the machine.

An old hacksaw blade, sharpened on one edge, makes a good tool for breaking gasket joints when dismantling compressors. The hacksaw blade seems to stand more pounding than any other instrument I have found, and because it is thin, it has a better wedging effect than an ordinary knife.

Joseph J. Nuelle
Missouri

I have been a reader of your worthy paper, THE REFRIGERATION SERVICE ENGINEER for three months, and I feel I'll not want to miss any issue.

A New Locker System

By C. L. BENSEN*

A LONG step forward in the design of locker plants has made possible the elimination of the expensive separate room used for sharp freezing purposes in the conventional type plant. A separate cork insulated room with extra heavy refrigerator door, and a complete set of sharp freezing coils is totally unnecessary now that it is possible to make use of a sharp freezing cabinet located adjacent to a floor type low temperature refrigeration unit of the forced convection type.

The Zero-Pak system employs a large fin-coil, eight rows deep for use with standard refrigerant having an efficient sirocco type blower and employing a special electric motor designed for low temperature application. The sharp freezing cabinet is of the same general size and appearance to a group of eight regular size lockers. The model shown in Fig. 1 will handle 300 lockers, approximately, and requires a three horsepower water cooled compressor. Units are also available for use with ammonia refrigerant.

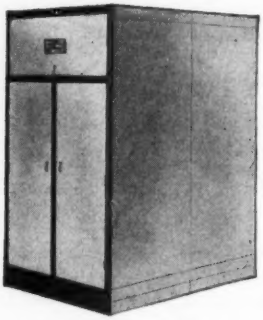


Fig. 1—The Zero-Pak unit.

Water defrosting is employed with this new low-temperature unit. This new development has been carefully tested in the McQuay laboratory as well as in the field for several months with very unusual advantages. The defrosting operation requires less than ten minutes, in most cases. It is not necessary to warm up the locker room or sharp freezer cabinet when defrosting. There is no labor whatever required, simply the throwing of a lever controlling a compound valve.

All of the advantages of the older low-temperature unit have been retained in this new and improved model. The unit provides a zero sharp freezer with a plus five to plus eight degrees locker room using but minus five degrees suction temperature refrigerant. It is obvious that the "horsepower per ton" is far better with this small temperature difference in comparison with the steel pipe and plate type of low temperature equipment where temperature differences of 25 to 30 degrees are customary.

It has been thoroughly proven in scores of plants now using the McQuay Zero-Pak system that meat and other products can be solidly frozen more rapidly at zero F., with brisk air motion than could be accomplished with the older iron coil or plates using stagnant air at 15 degrees below zero.

Higher humidity is another result of using high back pressure with the resulting small temperature difference between the refrigerant gas and the sharp freezer or locker room temperature. The large heavy duty economical aluminum fin coil makes this possible. High humidity provides the ideal conditions for the storage of all food products. Dried up shrunken meat with the unavoidable loss of flavor that follows dehydration is reduced to an all time low with the system. A second advantage is in additional power saving due to the fact that less moisture is taken out of the air. It requires approximately 1100 B.t.u. to remove one pound of moisture from the air. By removing less moisture from the air, power is naturally saved. In addition it requires 144 B.t.u. to freeze one pound of moisture which has been removed from the air as frost or ice on the cooling coil. This is also saved and reduced to a new all time low.

All odors that may be present in locker rooms are carried by the moisture in the air, principally. These odors are carried to the coil and the small amount of frost that does

* Chief Engineer, McQuay, Inc.

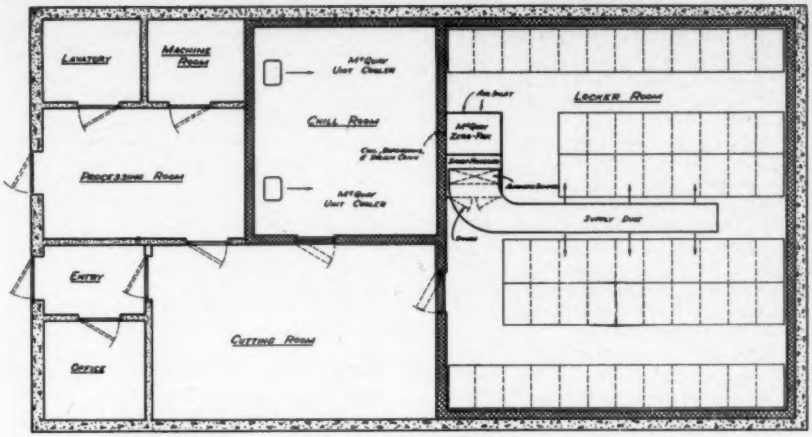


Fig. 2—Floor plan of locker plant showing method installing Zero-Pak unit.

form on the aluminum fins contains most of the odors. When the coil is defrosted with water and is washed thoroughly several times a week, these odors are carried down the drain with the frost and ice. This is very important as a clean, fresh smelling locker room is of vital importance.

Installation costs are much lower with this factory built unit. Weeks of hand work are eliminated. One large heavy duty expansion valve replaces as many as ten or twelve small and delicate expansion valves

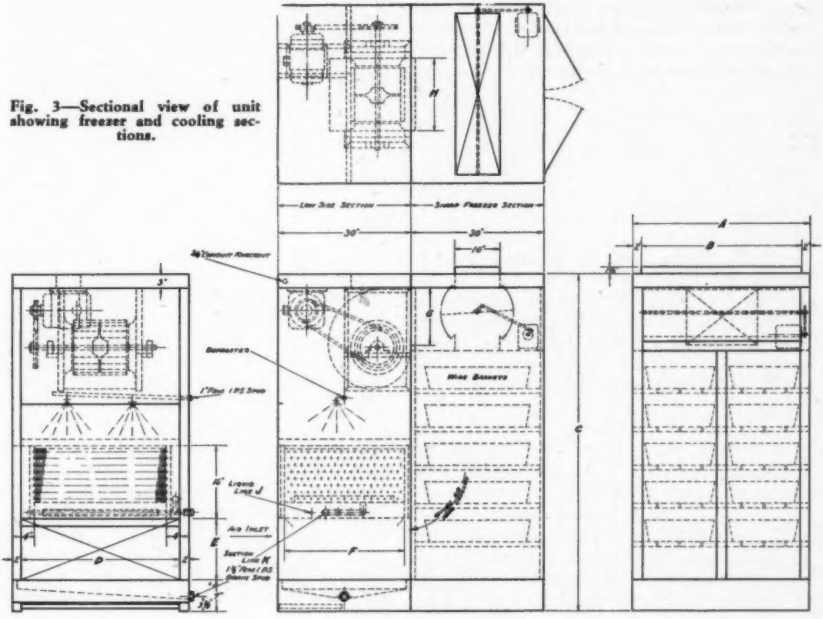


Fig. 3—Sectional view of unit showing freezer and cooling sections.

on ordinary systems. Only one liquid line and one suction line are run to the compressor from the unit.

The Series "Z" unit is shown in Fig. 2 installed in a typical locker plant layout. The sharp freezer is now an integral part of the Zero-Pak unit. It consists of an enameled steel cabinet containing a number of wire shelves and matching the standard lockers in general appearance and dimensions. The products to be frozen are placed in wire baskets and loaded into the freezer cabinet. The cold air direct from the blower is deflected by the damper arrangement, in the upper section of the cabinet, over the products at high velocity. "Freezer burn" is eliminated because the heat is removed from the product from all sides, uniformly, by the air stream, rather than by direct contact, at a few points of small area, with the extremely cold iron surface of the refrigerating coil. After passing over the products being frozen, the air returns directly to the big aluminum fin coil for recooling and recirculation. See Fig. 3.

The temperature of the sharp freezing cabinet is controlled by the automatic proportioning damper arrangement. The locker room temperature is determined by the room thermostat and the automatic damper setting. A short distributing air supply duct is recommended to insure uniform temperatures in all parts of the locker room. The return air from the locker room enters the unit as indicated in Fig. 2.

When the frost condition of the coil indicates that defrosting is required, it is only necessary to close the liquid refrigerant valve, turn off blower switch and close defrosting panel at air inlet to unit. The three-way water valve is opened and the defrosting attachment washes all frost and ice from the coil in ten minutes. Allow five minutes for the unit to drain after defrosting. Place the unit back into normal operation by opening the air inlet panel, starting blower and opening the liquid refrigerant valve.

PORTABLE AIRPLANE AIR-CONDITIONERS POWERED BY GASOLINE ENGINES

Here is another example of the ever widening field of application for merchanical refrigeration. New applications of this type open up new fields of endeavor for all those associated with the refrigeration industry.
—Editor.

THE problem of passenger comfort, which is receiving more and more attention each year in all types of transportation service from motor cars to ocean liners, has been responsible for the development of a very efficient type of airport service equipment.

During flight, transport planes are kept warm and comfortable, when heat is required, thru the utilization of engine exhaust heat. In warm weather the ventilating system, which is a part of the modern plane's equipment, provides an ample supply of cool air to maintain comfortable cabin temperatures. However, while the airplane is at the airport without the engines running, there is a definite need for auxiliary heating in winter, just as there is the necessity to provide cool, fresh, filtered air to the ventilating system on warm summer days.

To meet these conditions, a portable air-conditioning unit has been developed by General Refrigeration Corporation of Beloit, Wisconsin. This unit consists of a Ford or Chevrolet truck with a special body, in which is installed an engine-generator set, an isolated refrigerating machine, an air-conditioner operated on direct or heat pump cycle, and a new type of evaporative condenser. The engine generator set consists of a United States electric generating plant powered by a Hercules six-cylinder gasoline engine, Model QXB, 4¼ inches by 4⅛ inches, with automatic speed control. At the rear of the generator is a clutch housing and a shaft extension for V-belt drive for operating the four-cylinder compressor. In addition to driving the compressor, the Hercules engine furnishes the power for driving the generator which supplies the current for the blower and condenser fan motors, as well as a bank of four electric heaters.

In winter operation, cold outside air is drawn thru the filter system and exposed to a hot water coil, the source of this heat being the engine jacket water. The air is then passed thru the bank of four electric heaters mentioned above. In summer, the warm outside air is passed thru filters into a cooling unit which reduces both temperature and humidity.

In addition to supplying both summer and winter cooling and heating needs, these completely mobile units have another important feature in that they are a source of emergency electrical energy up to 15 K. V. A. for operating practically any airport electri-

cal equipment. Three receptacles in the back of the unit are provided for this emergency service.

The advantage of having equipment of this type readily available was demonstrated on two occasions in one year at the Chicago Municipal Airport. Because of damage done by storms the airport was without electrical power. As a result the radio was silenced, the radio beam was dead—in fact, operations were completely crippled. To meet this emergency the airport air-conditioning trucks were pressed into service. One was plugged in to provide light and power for the hangar while another was utilized for supplying power to the airport power system. With the help of this emergency power the radio equipment was put back into service and planes were landed in a normal manner. The last time this happened the entire Chicago area was without power for a considerable length of time and the airport radio, powered by the generator on one of the air-conditioning units, was the only station on the air.

Although permanent stations for heating and cooling cabin interiors while the airplane is at the airport are in use, the trend is said to be toward completely portable, compact, self-contained air-conditioning systems of ample capacity for servicing today's largest ships.

Second Article

Multiple Installations

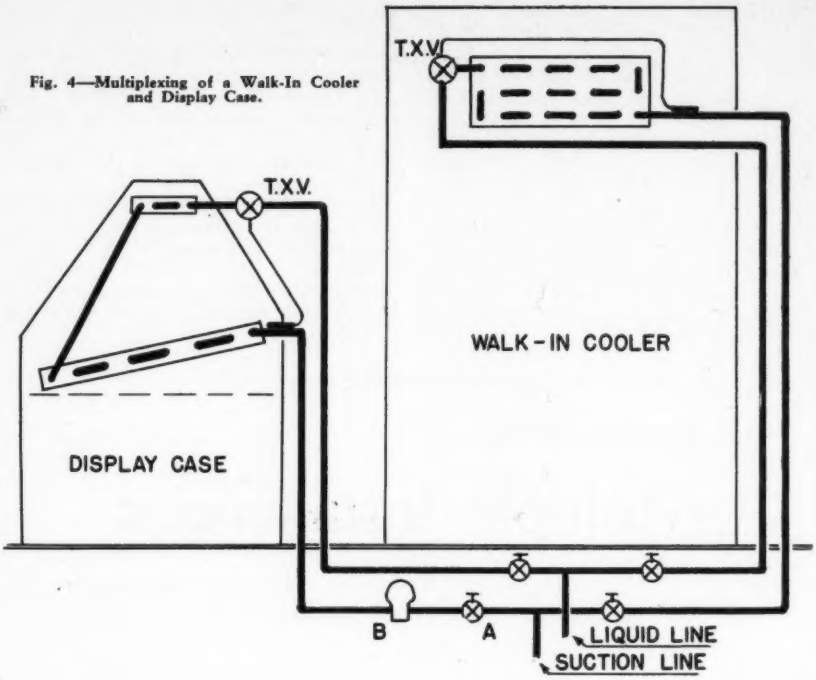
The first article of this series discussed the rules of multiplexing. Specific examples of application are discussed in this article.

IT is difficult to lay down definite rules to be used in the multiplexing of systems which will apply to all cases, and it is therefore necessary that each case be given considerable thought on its own merits before installation, and be engineered accordingly. A few typical examples of installations will be discussed here which may be used as a general guide for installations of a similar nature. We will take for our first example, an installation involving a display case and walk-in cooler hook-up, operated on one condensing unit. The type of service this equipment will receive, and the temperatures required in each, will govern the manner in which they are multiplexed. There are approximately three manners in which they may be controlled.

Referring to Fig. 4, it will be noticed that the coil in both the case and the cooler are of a fin type, and we will assume that it is desired to operate these fixtures at a suction pressure of 12 lbs. methyl chloride, and the approximate temperatures maintained in each will be 40 degrees F. No control valves would be used in the suction lines. Due to service conditions in each, no definite temperature can be maintained in the case. During times of excess usage, the case temperature may go as high as 50 or 55 degrees, and the walk-in cooler temperature may vary slightly. However, on this type of installation, the walk-in cooler represents the major part of the load on the condensing unit, and its temperature will be steadier than can be obtained in the case. The service load and usage will have a direct bearing on the temperatures obtained in both fixtures.

A second method of control of this same installation, where uneven suction pressures must be maintained in order to obtain the temperatures we require may be accomplished by throttling the manifold valve (A) in Fig. 4. We may assume that in this example, it is desired to maintain suction pressures in the display case at 12 lbs. methyl chloride, in order to obtain 40 degrees F. temperature, and that it is desired to operate the walk-in cooler at a suction pressure of 8 lbs., in order to obtain 40 degrees F. temperature. Of course, using this method, no definite case temperatures can be guaranteed. The method consists merely in placing a restriction, which in this case is a hand shut-off valve, in the suction line to the case, which operates at the highest suction pres-

Fig. 4—Multiplexing of a Walk-In Cooler and Display Case.



sure. The low pressure control on the compressor will have to be adjusted to the correct temperature conditions in the walk-in cooler.

The third, and best, method of control involves the use of a snap-action valve (B) Fig. 4 in the suction line of the display case. This valve should be set to cut out at 12 lbs. and cut in at 27 lbs., in order to maintain a 40 degree F. case temperature. The switch setting on the compressor will be set at 25 lbs. cut in temperature, and 8 lbs. cut out, in order to obtain a 36 degree F. walk-in cooler temperature. By the use of this snap-action valve, a definite cycle will be maintained on the case, and definite temperature conditions will result. Therefore, we have a positive control and guaranteed temperatures in both fixtures.

However, if the rules regarding multiplexing, as outlined previously, are disregarded, serious problems may interfere with proper temperature and operating conditions. An example of this is where a heavy service load is to be placed in the case, which might necessitate operating the case at a lower suction pressure, which would then offset the use of a snap-action valve, and we would have an installation with operating characteristics similar to that outlined in our first example. The methods outlined here as applying to the case and cooler hook-ups can also be applied to other types of equipment, multiplexed on one condensing unit.

A good example of where service conditions may change operating conditions on multiplexed equipment, can be noted by taking for an example an installation where several display cases are operated off one condensing unit. We will take as an example a system designed to operate on a temperature of 40 degrees F. in all cases, and on which a pressure of 12 lbs. would be maintained on each evaporator. The switch setting in this case would be 8 lbs. cut-out, and 25 lbs. cut-in. After the installation had been placed in operation, however, it was found that the service load on each case interfered with the temperature conditions. If we assume that two of the cases had heavier service loads on them than was encountered on the other cases, we know that in order to produce a 40 degree F. temperature, it becomes necessary to lower the

average suction pressure maintained on the two cases with the heaviest loads. Naturally, the switch setting on the unit would have to be lowered in order to accomplish the lowering of the temperature in the two cases, but this adjustment, in turn, would interfere with the other cases on the system, making them colder than was desired by the user. Under these conditions, the only solution would be to install a snap-action valve in the suction line of the cold cases, so that this valve could be set to maintain a warmer temperature in these cases than is obtained in the two heaviest-load cases.

A rather common application where service problems interfere with walk-in cooler temperatures, involves a case and cooler hook-up. In this particular installation, the user is in the habit of shutting off the case completely by closing off suction line valves over the weekends, and invariably, complains of high walk-in cooler temperatures during this period. During normal operation on week days, of course, the walk-in cooler temperatures are normal. This can be explained by the fact that when a portion of the load on the multiplexed installation is shut off, a change takes place in the operating back pressure of the remaining fixtures, and the compressor running-time is affected.

Fig. 5 shows the hook-up of a multiple system having four evaporators, each of which is controlled at different temperatures, and the temperature of each may be adjusted independently of the other evaporators on the system. The coldest evaporator, as usual, will be regulated by the pressure control, controlling the operation of the highside. Another evaporator may be regulated by a means of a thermostat and solenoid valve in the liquid line, as shown. Another evaporator depends for temperature regulation upon a snap-action two-temperature valve, and the fourth evaporator is maintained at very nearly a constant temperature by a temperating valve in the suction line of that evaporator.

Forced Air Evaporators on Multiple Systems

Where forced air units are to be used in a multiple system, all conditions and possibilities of operation must be very carefully studied before the installation is made. The same liberties taken with other types of evaporator equipment cannot be taken with forced air units. Extreme caution must be taken in the application of these units because it is very easy, on certain types of such installations, to reach excessively low refrigerant temperatures, which will result in frosting or upset the temperature differential when cooling products that are easily dehydrated.

A multiplexed installation, where the cooler employs a forced air evaporator, and is the controlling factor on the installation, so that the cooler is operated at a controlled temperature with other fixtures riding along, without an attempt to definitely control their

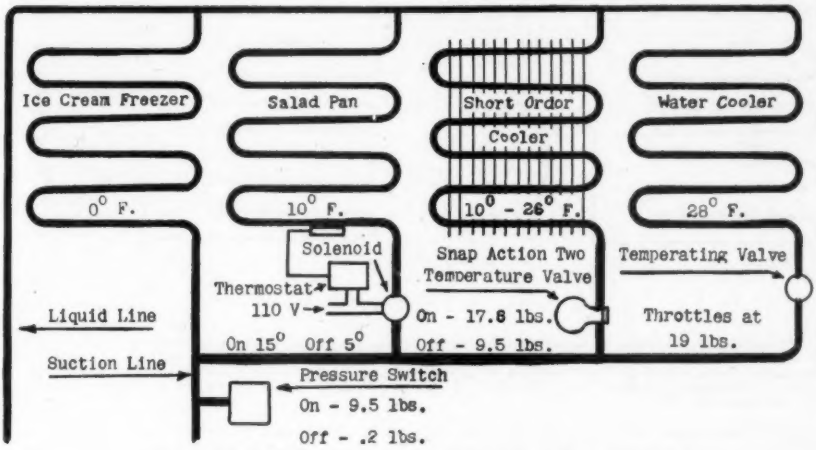


Fig. 5—Four different temperature evaporators connected in multiple.

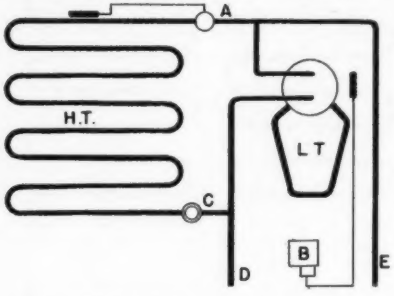
temperatures, can be successfully operated in multiple, providing the cooler temperature and refrigerant temperature selected are in keeping with the limitations for the application of this type of evaporator. Due to the high refrigerant temperatures at which the forced air units are operated, however, high case temperatures will be inevitable, particularly in those types of cases requiring low refrigerant temperatures for 40 to 50 degree F. platter temperature. The snap-action two-temperature valve should, in most cases, be used to control the forced air unit where fixtures of lower temperature are employed on the same multiple system. However, if all fixtures operate on a defrosting cycle, it is not always necessary to use a snap-action valve on the forced air unit.

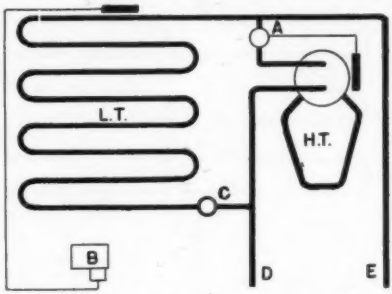
When a definite cycle on the forced air unit is not required, the throttling type of valve, or temperating valve, may be used. The purpose of the valve, of course, is to regulate back pressure on the forced air evaporator, and providing the switch setting on the compressor is such that it permits a long enough off-period, at a high enough back pressure, to allow defrosting, the throttling type of valve can be successfully used.

There is no definite differential adjustment incorporated in the throttling type of valve, and it should not, for this reason, be used, on any installation where automatic defrosting of the evaporator is desired. The valve, however, can be used on any type of installation where all the evaporators are operating at all times above the frost point. Some of these valves have built into them a connection on the evaporator side, which is intended for the purpose of obtaining evaporator pressures when adjusting the valve. The connection may also be used as a by pass for pumping down the particular evaporator which it controls.

Multiplexing Ice Cream Cabinets

Multiples of ice cream cabinets, employing both flooded or automatic expansion valve systems, can be satisfactorily controlled through the use of solenoid valves, and cold controls controlling the solenoid valve. Fig. 6 shows the method of using a solenoid valve with cold control, and the method of laying out the refrigeration hook-up when multiplexing an ice cream cabinet, using the automatic expansion valve on one compartment and a flooded coil in another. It will be noted that the solenoid valve should be placed in the suction line of the coil requiring the highest temperature setting. The bulb of the thermostat, in this case, should be placed in the well provided for the thermostat control bulb, or submerged directly in the brine. If the cabinet, or compartment, to be refrigerated is of the dry type, employing no brine, the thermostat bulb can be attached so that it will register the coil temperature. The thermostatic switch operated by temperatures in the coldest cabinet controls the starting and stopping of the condensing unit.





Figs. 6 and 7—When operating coils fed by automatic expansion valves in multiple with flooded coils, it is necessary to control the warmest coil with either a solenoid-thermostat combination or a temperature regulating valve. In these two hook-ups A is the temperature regulating valve, B the thermostat motor control, C—expansion valve, D—liquid line, E—suction line, H.T.—high temperature coil and L.T.—low temperature coil.

Fig. 7 shows the location of the thermostatic switch and the cold control solenoid combination when the flooded coil cabinet is operated at a higher temperature than the expansion valve cabinet. The bulb from the cold control solenoid combination, as in the former case, will be located in the well provided for it.

Fig. 8 illustrates the hook-up when two ice cream cabinets using automatic expansion valves are installed in multiple. The

solenoid cold control combination is installed to control the temperatures of the warmer cabinet, and the thermostatic switch controls the temperature of the colder cabinet by controlling the operation of the compressor. This type of hook-up gives a convenient manner of control to the user in that both the thermostatic motor switch, and the cold control on the solenoid, provide the manual adjustment of temperature, which is convenient to the user's use.

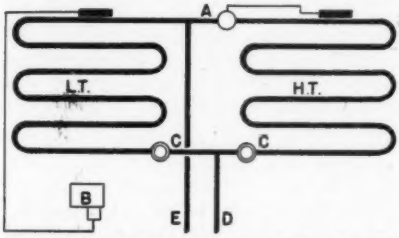


Fig. 8—Illustrating method of controlling two ice cream cabinets fed with automatic expansion valves.
A—Temperature regulating valves.
B—Thermostat motor control.
C—Expansion valves.
D—Liquid line.
E—Suction line.
L.T.—Low temperature coil.
H.T.—Higher temperature coil.

To sum up the entire matter, we can say, in general, that any number of coils may be connected to one machine, and the temperature of each coil may be varied independently. The governing factor in doing this, is that the coldest coil must be connected directly into the suction line, and be regulated by the pressure control setting at the machine. If desired, the control of all evaporators could be adjusted independently of the setting at the machine, and the pressure control could be adjusted at the machine to stop it when all evaporators were down to their minimum temperature, and all valves in the system were closed. In other words, the machine would stop when all temperature valves were closed so that the suction pressure would pull down to a subnormal level. The machine could then be required to start at a comparatively low pressure so that as any of the coils warmed up and the temperature regulating valves used in conjunction with them opened, the suction pressure at the machine would rise, and the machine would operate.

(Concluded)

S S S

H. R. Godbein
Canada

You certainly have a wonderful book.

Auxiliary Receiver to Increase Pump Down Capacity

ON some of the older model machines the receiver was not large enough to pump down the entire charge of refrigerant from the flooded coils connected to it. To remedy this condition, an auxiliary receiver in series with the original receiver can be installed.

Connections to the auxiliary receiver should be made as shown in Fig. 1, except that a standard air cooled receiver is used and sufficient refrigerant added to the system to provide a liquid seal in the auxiliary receiver. It is advisable to have both receivers on the same level, although they work satisfactorily on different levels.

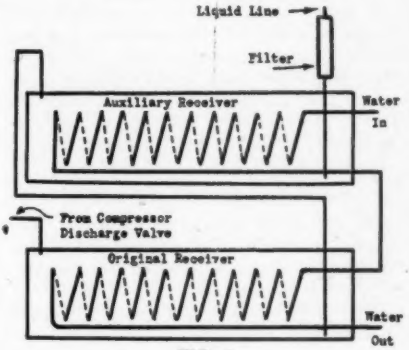


FIG. 1.

The idea can be used on either air-cooled or water-cooled machines to increase pump down capacity. It can also be used on air-cooled machines to increase condensing capacity during the hottest part of the season by using a water-cooled condenser receiver and shutting off the water during the winter months.

If additional liquid cooling is required on a water-cooled unit, a water-cooled condenser receiver can be used and connected as shown in Fig. 1. If additional cooling is not required, but more pump down capacity is needed, the standard air-cooled receiver may be used.

S S S

Curtis F. Hill
Indiana

You have a wonderful journal in THE REFRIGERATION SERVICE ENGINEER and I have all copies since my first subscription three years ago and don't want to miss a single copy.

Analysis of the Rating and Performance of Fin Coils

By J. O. SCHULTZ *

THE presentation of this treatise on fin coils is made with the intention of creating a better understanding of fin coil construction and application and to provide much of the necessary background to good judgment in the use of fin coils.

It is hoped too, that the information presented here will help the field man in calculating the coil capacity on those jobs where the rating is not given on the coil, and where it becomes necessary to make a complete survey of an existing installation before an analysis of trouble can be completed.

Calculating Surface of Fin Coils

To figure the surface of a fin coil, both sides of the fin are to be considered as secondary surfaces, and the surface of the tubes as primary surface.

Thus a fin 3 inches × 3 inches is 9 square inches, from which deduct the area of ⅝ inch O. D. tube (which is 0.3068 square inches), leaving 8.6932 square inches per side of fin.

With ½ inch fin spacing, you have two fins per inch. Therefore, the secondary surface per inch of finned length = 8.6932 × 2 sides × 2 fins = 34.7728 square inches. The primary surface consists of one inch of tube length × its circumference, which is 1.963, equalling 1.963 square inches per one lineal inch. The total surface is the secondary plus the primary surface: or—

34.7728 + 1.963 = 36.7358 sq. in. or 0.255 sq. ft. surface per inch of finned coil tube length, or 0.255 × 12 inches = 3.06 square foot surface per 12 inches of tube length.

A coil with 12 tubes, ½ inch fin spacing, 60 inches finned length = 184 square feet of surface.

Heat Absorption

The amount of heat that a fin coil can remove from a refrigerated space is known as its Btu capacity, and should be listed in basic Btu capacity per hour per degree temperature difference between average room temperature and refrigerant suction gas temperature in the coil. Therefore, if you have a room at 34 degrees with a 23-degree suction gas, or a temperature difference of 11 degrees, the total Btu capacity of the coil equals the basic Btu rating × 11 degrees.

A rather misleading method occasionally used in rating Btu capacities of fin coils, employs 15-degree temperature difference and constant operation. A comparison of this and other methods are given in the following:

A finned coil of 12⅝ inches O. D. tubes with three-inch square fins spaced two per inch to a length of 60 inches, containing (as previously shown) 184 square feet of surface, is listed as having a capacity of 3,600 Btu per hour at a 15-degree T. D. and constant operation. Therefore 3,600 ÷ 15 degrees = 240 basic Btu per degree temperature difference coil capacity.

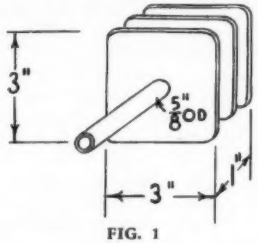


FIG. 1

The heat transmission or K factor per square foot of surface in this case would be the basic Btu capacity divided by the square feet of surface or 240 ÷ 184 = 1.305 Btu per sq. ft. per degree temperature difference. It is impossible to secure such a high K factor with gravity air circulation on a coil with three-inch square fins and ⅝ inch O. D. tubes where the percentage of primary surface to the total is only 5.35 percent. The

* Rempe Company, Chicago, Ill.

true K factor in this case should be 0.92 Btu per sq. ft. per degree temperature difference.

Assuming you will operate the compressor the usual 16 hours per day instead of constantly for 24 hours per day, the coil capacity will then be 3,600 × 16 ÷ 24 = 2,400 Btu per hour. This 2,400 Btu divided by the product of 15-degree temperature difference and the 184 square feet of surface equals 2,400 ÷ (15 × 184) = 0.87 Btu per sq. ft. per degree, more nearly correct to the theoretical figure of 0.92.

A fin coil constructed with a larger fin must contain more total square feet of surface to do the same amount of refrigeration work. This is due to the percentage of primary (tube) surface being smaller than when using a smaller size fin.

A fin coil with four-inch square fins spaced two per inch on ⅝ inch O. D. tubes has the following surface per inch of finned tube length.

Fin 4 inches × 4 inches = 16 square inches from which deduct the area of ⅝ inch O. D. tube which is 0.3068 square inches, leaving 15.6932 square inches per side of fin. 15.6932 × 2 fins × 2 sides = 62.7728 square inches, plus 1.963 square inches of primary surface = 64.7358 square inches.

The primary surface being 3.035 percent, the resultant K factor is only 0.66 Btu per sq. ft. per degree temperature difference instead of 0.92 Btu for the three-inch square fin. Therefore a coil with three-inch square fins of 184 square feet of total surface must be increased to one containing 184 × 0.92 ÷ 0.66 = 256 sq. ft. when using four-inch square fins.

Increasing Secondary Surface

Placing more fins per inch of tube length, or increasing the size of the fin to secure more surface has a similar effect on the coil capacity since the primary surface is not increased. A coil with three-inch square fins spaced three per inch on ⅝ inch O. D. tube has the following surface:

Fin 3 inches × 3 inches = 9 square inches from which deduct the tube area of 0.3068 sq. ft. leaving 8.6932 square inches per side of fin. With ⅓ inch fin spacing (or three fins per inch) the secondary surface equals 8.6932 × 3 fins × 2 sides = 52.1592 square inches.

The primary surface of one inch of tube length = 1.963 square inches, therefore 52.1592 plus 1.963 = 54.1222 square inches or 0.376 sq. ft. surface per inch of finned length.

The primary surface being 3.63 percent, the resultant K factor is only 0.74 Btu per sq. ft. per degree temperature difference instead of 0.92 Btu when using 2 fins per inch. Therefore when using three 3-inch square fins per inch, instead of two 3-inch square fins per inch containing 184 square feet of surface, it is necessary to increase the coil to 229 feet of total surface. (184 × 0.92 ÷ 0.74 = 229).

Decreasing the size of fin, increasing the size of the tube, or increasing the fin spacing and thus using less fins per inch, will require less total surface in the coil to do the same refrigerating work.

Conserving Coil Space

If space for the coil is limited you can get the same refrigeration effect by using a smaller fin, thereby reducing the overall dimensions of the coil. Here is an example: A coil is required with a basic rating of 169 Btu per hr. per degree temperature difference. The coil previously described is two tubes high, six tubes wide with two three-inch square fins per inch and a 60-inch finned length, containing 184 square feet of surface with a K factor of 0.92. It has the above capacity and would measure 6 inches high, 18 inches wide and 67 inches long overall.

A fin coil constructed of ⅝ inch O. D. tubing with two two-inch square fins per inch has a K factor of 1.296 and the surface equals 0.1162 sq. ft. per tube per inch of finned length.

To determine required surface of coil when using the smaller fin, divide 169 Btu by 1.296 = 130 square feet. Since one inch of finned tube length contains 0.1162 square feet of surface, divide 130 sq. ft. by 0.1162 and you get 1,119 inches of finned tube length required for the capacity of 169 Btu.

The two-inch fin permits the use of three tubes high for a height of six inches and as this size return bend is shorter than when using a three-inch fin, the length can be 62 inches over fins. Therefore the number of tubes wide would be 1,119 ÷ 3 × 62 = 6 tubes wide. This makes the overall dimensions of the coil 6 inches high, 12 inches wide, and 67 inches long overall, or a reduction in width of 6 inches.

The size of the tubing must be proportioned to the refrigerating load, as well as to the temperature of the suction gas and

the kind of refrigerant used. The heavier the refrigerant gas the larger the tube size must be, as otherwise the frictional resistance becomes excessive. It is this frictional resistance that causes a pressure drop in the suction pressure between the coil side of the expansion valve and the coil outlet to the suction main. A fin coil that is rifled, or has an inner fin, or is furnished with crimped return bends, will have a greater friction loss than a plain tube.

Increasing the velocity of the refrigerating gas travelling through the coil tube will improve the heat transmission factor of the coil up to a certain point. Beyond this point an increase in velocity becomes a detriment. Therefore any coil of 5/8 inch O. D. tube size having a total hourly capacity (not the basic capacity, but the basic capacity times the temperature difference) of 1,000 or more Btu should contain no features which tend to increase the friction loss.

Preferred Gas Velocity

The lighter or less dense the refrigerating gas, the higher the gas velocity can be in the coil tube. The preferred gas velocity for the common refrigerants when operating fin coils with a 23 degree suction gas temperature is as follows (in the order of density):

Refrigerant		ft. per minute
Ammonia	NH_3	777
Sulphur Dioxide	SO_2	677
Methyl Chloride	CH_3Cl	607
Freon	F12	365
Carbon Dioxide	CO_2	288

These figures show at a glance that you can put more than twice as much ammonia gas through a given tube, than you can Freon with no greater loss in frictional resistance or pressure drop. Now let us consider what happens when we are using one refrigerant, say methyl chloride, at various suction gas temperatures.

The lower the suction gas temperature of any refrigerant, the lighter or less dense the gas becomes. Therefore, from the previous statement, we can see that the velocity in the coil can be increased. On the face, it would appear that you could therefore use a smaller tube at lower suction gas temperatures, but just the opposite is true. The reason for this is that at lower suction gas temperatures, more gas must be circulated to do the same refrigerating work, and more of the liquid refrigerant must be expanded at the expansion valve to reduce it from condensing temperature to evaporating temperature.

Methyl Chloride at a suction gas temperature of 23 degrees can have a gas velocity of 607 feet per minute, whereas, at minus ten (—10) degrees, the velocity can be 912 feet per minute. Making a comparison on the hourly Btu capacity, a 5/8 inch O. D. × .035 wall tube, at 23-degree suction gas temperature will carry 3,000 Btu, but at minus ten (—10) degrees will carry only 2,100 Btu.

The coil having a basic Btu capacity of 169 Btu constructed of 5/8 inch O. D. tubing can be used for Methyl Chloride, providing no greater than a 17-degree temperature difference is used between room and coil suction gas. 169 Btu × 17 degree temperature difference = 2,873 Btu per hr. If intending to operate this 169 Btu coil at 20-degree T. D., the Btu hourly capacity would be 169 × 20 = 3,380 Btu and would require 3/4 inch O. D. size tube.

Length of Tube Affects Resistance

The total length of the tube in the coil has some bearing on the frictional resistance, but for all practical purposes, basing the tube size on the Btu coil capacity is the simplest and safest.

Considering the 12-tube coil with 60-inch finned length, having 68 lineal feet of 5/8 inch O. D. tubing and a basic capacity of 169 Btu per hr. per degree, when operating at a 10-degree differential (that is a room temperature average of 33 degrees and a suction gas temperature of 23 degrees), the coil capacity would be 169 × 10 = 1,690 Btu per hour. Using this same coil where the room temperature is 45 degrees and the gas temperature 20 degrees would theoretically increase the coil capacity to 169 × 25 = 4,225 Btu per hour causing an increase in velocity of the gas in the coil to more than 2½ times as much.

The case of the 45-degree room and 20-degree gas temperature, or a 25-degree differential is no exaggeration. Unfortunately this large differential is very much in evidence on installations where mistakes in coil rating have been made.

The maximum permissible Btu hourly capacities when operating with suction gas temperatures of 20 to 25 degrees used for the various size tubes and various refrigerants are as follows:

Tube Sizes O.D.	B.t.u. Per Hour Freon	Methyl Chloride Sulphur Dioxide	Ammonia
⅝″	2000	3000	6500
¾″	3000	4500	9500
1″	6000	8000	17000

If the refrigerated space has a heat load of 64,000 Btu per 24 hours, and it is desired to operate the refrigerating machine two-thirds of this time, or 16 hours per day, the hourly load will be 64,000 ÷ 16 = 4,000 Btu per hour coil capacity and machine capacity.

If using Freon refrigerant the coil must be arranged in two separate coils, each with its own expansion valve, or with a multiple port expansion valve feeding the two coils separately. This is true when using ⅝ inch O. D. or ¾ inch O. D. tubing. When one inch O. D. tube is used it can be made into one coil.

As previously pointed out, increasing the tube size increases the K heat transmission factor of the coil as these examples prove:

Square Fin Size	Spaced Per Inch	O.D. Tube Size	K Factor
2⅞″	2	⅝″	0.94
2⅞″	2	¾″	1.03
2⅞″	2	1″	1.17

Also you will see by these examples that the higher K factor permits you to do the same work with less coil surface:

For 4,000 Btu per hour capacity with the refrigerator at 34 degrees and gas temperature of 23 degrees you will require the following square foot surface:

$$\frac{\text{4,000 Btu}}{\text{T. D. (34-23)} \times \text{K 0.94}} = \text{387 sq. ft. when using coil with ⅝ inch O. D. tubing}$$

$$\frac{\text{4,000 Btu}}{\text{T. D. (34-23)} \times \text{K 1.03}} = \text{354 sq. ft. when using coil with ¾ inch O. D. tubing}$$

$$\frac{\text{4,000 Btu}}{\text{T.D. (34-23)} \times \text{K 1.17}} = \text{311 sq. ft. when using coil with 1 inch O. D. tubing}$$

A Balanced System

It should be the aim to have a good balance between the size of the refrigerating machine and the coil. If the coil is small, or the machine is large, the suction gas temperature will drop until the capacity of the machine is reduced to a common point where the temperature difference increases the coil capacity to meet this common point.

Using the example of the daily 24-hour load of 64,000 Btu intended to operate 16 hours per day, a machine capacity of 4,000 Btu per hour at a suction gas temperature of 23 degrees would be required.

Assume the available machine has a capacity of 5,000 Btu per hour. It will then be necessary to reduce the speed of the machine 20 percent or increase the coil surface 25 percent over the amount shown for 4,000 Btu.

When increasing the coil surface to match the actual machine capacity, the plant will be in balance, but the operating time will be reduced to 12.8 hours per day (64,000 Btu ÷ 5,000 Btu = 12.8 hrs.).

Installing a coil of the capacity to balance the machine permits of operating a shorter period of time at a high suction gas temperature and maintains a higher relative humidity in the refrigerated space. Do not use oversize machines or undersize coils, for then the compressor will short cycle.

Do not use undersize coils as this will require too great a temperature difference between refrigerated space and suction gas. The lower the suction gas temperature, the drier the air will be in the refrigerator, thus lowering the relative humidity and dehydrating the product.

Affect of Undersize Coil

What happens when a 5,000 Btu machine at 23 degree suction gas temperature, and a 3,000 Btu coil at an 11 degree temperature difference are installed in a refrigerator having a load of 4,000 Btu per hour at 34 degrees refrigerator temperature?

The fixed point is the load of 4,000 Btu. The machine capacity will be reduced, not by reduction of speed, but by reduction in gas temperature, and the coil capacity will be increased by operating at a higher temperature difference, since the capacity of 3,000 Btu was determined by a 34 degree room temperature and a 23 degree suction gas temperature. The basic rating of the coil is 3,000 Btu ÷ 11 degrees temperature difference = 273 Btu. To do 4,000 Btu will require a temperature difference of 4,000 Btu ÷ 273 Btu = 14.7 degrees or a suction gas temperature of 19.3 degrees.

A compressor having a capacity of 5000 Btu at 23 degree suction gas temperature will have a capacity of 4,550 Btu at 19.3 degrees, and must be further reduced to meet the coil capacity.

The compressor at 18 degrees suction gas temperature will have a capacity of 4,380

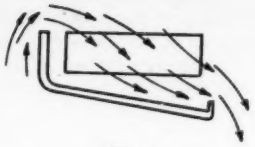


FIG. 2

Btu per hour and the coil at (34-18) 16 degree temperature difference will have 273 Btu $\times$ 16 degrees = 4,370 Btu per hour capacity. The daily heat load was 4000 $\times$ 16 hours = 64,000 Btu per day. This divided by coil and machine capacity (64,000 Btu $\div$ 4370 Btu) requires 14.65 hours of operating time. This reduction in gas temperature causes a drop in the relative humidity of the refrigerated space, due to the reduction in the dew point temperature of the air.

The drop in suction gas temperature to 18 degrees also warrants the use of a wider fin spacing on the coils. Therefore coils with ⅔ or ¾ inch spacing are to be selected.

absorbing various chemical elements, the air will be in continuous motion. We can therefore go a step farther and say that without air movement nothing can live.

We know that air when coming in contact with the refrigerated coil is cooled and drops toward the bottom of the refrigerator, creating an air motion. This air in passing over the product takes up its heat, and in passing over the wall surface takes up the heat leaking through the insulation. As this air becomes warmer, from absorbing heat, it will rise to the top of the refrigerator, where it again strikes the cold surface of the coils and is cooled, continuing the circulating cycle as before.

What is known as gravity air circulation is that due only to its weight increase and decrease caused by its becoming colder or warmer. Forced air circulation is that created by the use of fans or other mechanical means. Therefore, it can be seen that if you were to place a coil against the ceiling and then box up the sides and bottom, the only

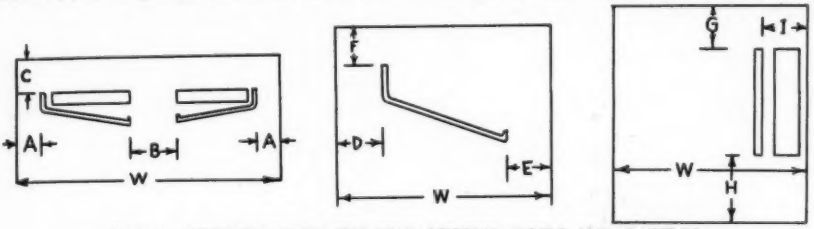


FIG. 3—RECOMMENDED SPACING AROUND COILS AND BAFFLES

A = .104 x W in inches
B = .229 x W in inches
C = A
D = .167 x W in inches
E = .229 x W in inches
F = D
G = .167 x W in inches
H = .229 x W in inches
I = Not less than G

Humidity

To maintain high relative humidity, it is necessary to specify large surface coils operating at a low temperature difference between refrigerated space and suction gas. The higher the temperature is to be maintained in the refrigerator, the closer the temperature difference must be held.

Air Movement

When we speak of heat removal as refrigeration work, we assume that this is accomplished by the refrigerant passing through the coil. This is true, but there is an auxiliary medium, air, without which nothing would be accomplished. This medium is a very important one, although it rarely receives proper consideration.

Without air, nothing can live. As the air structure becomes heated or cooled, or by

refrigerating surface to do cooling would be the outside sides and bottom of the box enclosing the coil, resulting in very little air circulation and requiring this air to be cooled lower than necessary. The lower the temperature of the surface that this air strikes, the more moisture will be dropped out of the air. This causes a lower relative humidity in the refrigerated space.

Placing a wide coil up close to the ceiling of a refrigerator cannot be efficient since air motion is vertical and not horizontal and in that case certain parts of the coil will have no air passing over them.

For the same reason a flat pan under the coil is not desirable, as the air when dropping after being cooled must push its way sideways before continuing downward. Placing the pan on an angle will greatly assist the air motion. To create a better air motion it is advisable to place what is commonly

known as a baffle board, from the high edge of the pan to near the top of the cooling coils. If this is not done, the cold air dropping from the coil will strike the warm air stream and retard it. A baffle board that is insulated can be placed within one inch of the side of the cooling coils. An uninsulated baffle board should be placed not closer than two inches to the side of the coil.

The warm and cold air passages in a refrigerator are to be of sufficient size to facilitate easy air motion, and the size of the passages should conform to the dimensions as outlined in Fig. 8. A single coil pan or side wall coil should not be used where refrigerator width is greater than six feet.

To assist the engineer in setting the pressurestat for the compressor operation, we list below the regular setting when operating with a 23 degree gas.

PRESSURESTAT SETTING FOR AVERAGE OF 23 DEGREE GAS TEMP.

Refrigerant	Cut-out Point	Average Running Point	Cut-in Point
Methyl Chloride	10 lbs.	16 lbs.	27 lbs.
Sulphur Dioxide	0 lbs.	3¾ lbs.	12 lbs.
Freon (F12)	17 lbs.	23 lbs.	36 lbs.
Ammonia	26 lbs.	36 lbs.	57 lbs.
FOR AVERAGE OF 19 DEGREE GAS TEMP.			
Methyl Chloride	8½ lbs.	13½ lbs.	25 lbs.
Sulphur Dioxide	2½" Vac.	2 lbs.	10 lbs.
Freon (F12)	14½ lbs.	20½ lbs.	33½ lbs.
Ammonia	24 lbs.	32 lbs.	53 lbs.

Third Article

History and Development of the Soda Fountain

In previous articles the author discussed the development of the soda fountain up to the introduction of the early mechanical models. A description of models found in the field today is included here.

By A. F. McMAHON*

THE next significant change in construction was the development of the stub brine tank. Up to this time all brine tanks had been made full depth, that is—the brine surrounded the can sleeve from top to bottom, and resulted in a considerably lower temperature at the bottom of the can than at the top. From a standpoint of food preservation that meant nothing, but to the fountain clerk that meant that if the ice cream was just right for dipping at the top of the can it would be too hard to cut with a knife at the bottom, or, inversely, if the bottom of the can was all right the top would be too soft for dipping.

This condition was corrected by raising the bottom of the brine tank to about the middle of the ice cream sleeve, but on the dispensing sleeves only, this gave the effect of confining the actual refrigeration to the top half of the sleeve, permitting air circulation within the sleeve to refrigerate the bottom that produced a very nearly equal temperature top and bottom of the can.

The brick compartment was left with full depth brine tank because their temperature difference had no effect and the additional refrigeration was desirable.

For apparent reasons this was known as the stub brine tank, but, of course, all manufacturers did not at once go to it, and I would like to digress for a moment to recount one of the oddest sales anecdotes I have ever heard. It concerns a worthy exponent of the full depth brine tank who, when confronted with the argument that the temperature would be lower at the bottom, replied, "All right, put a pail of water outside in cold weather and see where the ice starts to form, it's on the top, man, not on the bottom."

Despite that sterling salesmanship, the stub brine tank won out and is still used by the relatively few manufacturers still using brine.

* Service Manager, Bastian Blessing Co., Chicago. Paper delivered before the 6th Annual R.S.E.S. Convention.

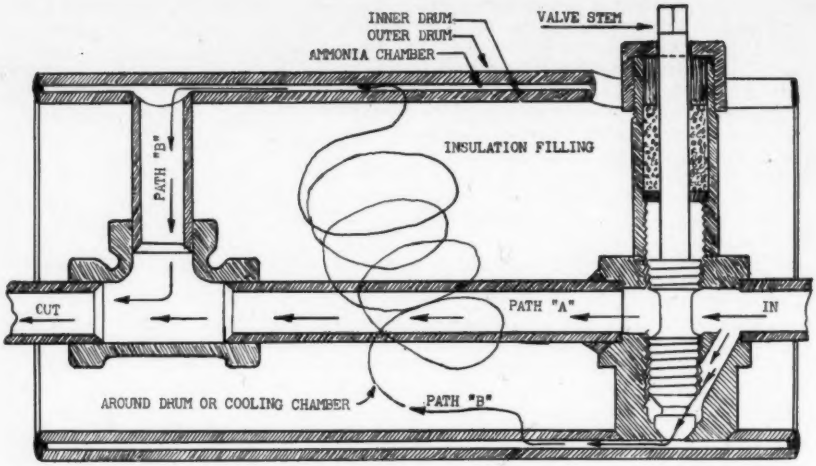


Fig. 12—The by-pass arrangement incorporated in the ammonia system for cooling the water bath. The device was entirely hand controlled by regulating the valve shown. A description of the unit was included in the April issue.

About this time Mr. Chandler of Atlanta's new drink, called "Coca Cola," was establishing new sales records, and Mr. Volstead and the W.C.T.U. did their bit to make the soda fountain a popular rendezvous. The water cooling load, both plain and carbonated, started to become a factor as well as the proper maintenance of syrups.

The first response of the industry was to supply a second float coil in the sweet water bath tank, refrigerated by the same condensing unit and held at a higher temperature by means of a spring or weight loaded two temperature valve.

The syrup jar compartment did not lend itself well to float coil refrigeration, so various methods were used to accomplish that with a tubing coil running from end to end.

One method was to maintain a shallow sweet water bath in the bottom of the compartment into which the syrup jars dipped; through this bath, from one end to the other, was run a copper tube—this tubing terminated at one end as the liquid supply line for the ice cream compartment float coil, the other end was connected to a special third valve on the water bath coil header, in such a way that it tapped into the boiler below the normal liquid level.

The operation was as follows: the water bath boiler maintained a constant liquid level with the temperature of the liquid refrigerant at about 20 degrees above zero.

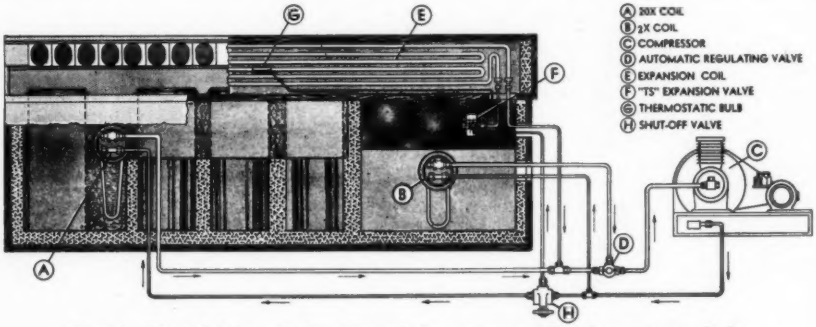


Fig. 13—The stub brine tank fountain employing a separate coil in the sweet water bath.

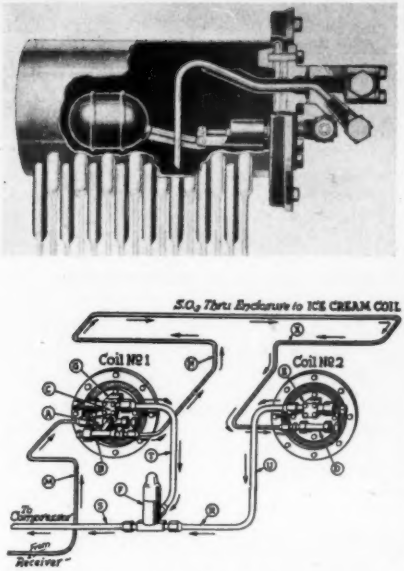


Fig. 14—A cutaway view of a Frigidaire boiler and system used in the first SO_2 Soda Fountains.

Now, whenever the ice cream boiler required liquid refrigerant, it drew it from the water bath boiler through the coil in the syrup jar enclosure, the 20 degrees liquid passing through that coil at intervals would form ice along the tubing. A variation of this system was one in which a straight expansion valve was used—the water bath boiler was of the conventional type, but the tubing through the syrup rail forming the ice cream boiler liquid line remained and was teed into the main liquid line, near the water bath boiler, and the straight expansion valve installed at that point. The valve was set to about 3 or 4 lbs., causing about 25 degree liquid to pass through the jar rail coil each time the ice cream boiler operated.

A third system eliminated the water bath in the syrup jar compartment and replaced it with a two inch brass tube filled with brine and containing a single hairpin turn of ½ inch coil, the tube being full length of the syrup jar compartment. A conventional water bath boiler and conventional ice cream boiler were used, not being interconnected in any way except at the compressor, as usual. The suction line from the water bath boiler, however, passed into the ice cream brine tank where it coiled several times around the ice cream boiler; from there it left the brine tank and entered the long brine tube in the jar compartment—from that tube it passed through a two temperature valve and entered the suction line to the compressor.

In operation, when the water bath boiler was in operation, the vapor passed through the coil in the cold brine tank, where it would recondense to a liquid, giving up its heat to the brine; from that point the liquified refrigerant passed into the coil in the syrup compartment brine tube, where it again expanded into a vapor, picking up the heat from that compartment, and accomplishing refrigeration. The two temperature valve was obviously necessary to control the temperature of the water bath boiler.

The weakness of that system is not at once apparent, but if you consider it care-

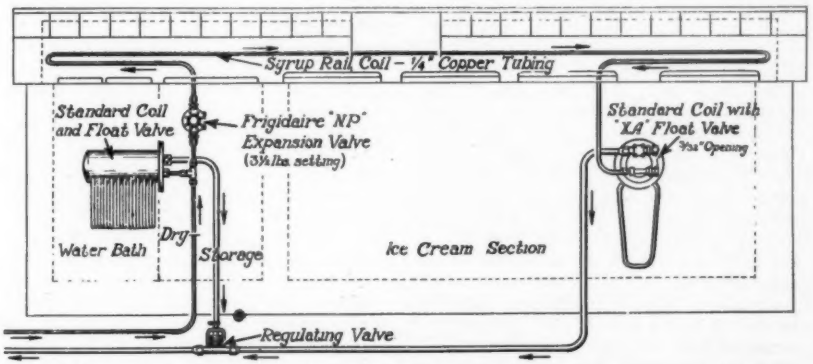

Syrup Rail Coil – ¼" Copper Tubing
Standard Coil and Float Valve
Frigidaire "NP" Expansion Valve (3½ lbs setting)
Standard Coil with "XA" Float Valve
3/32" Opening
Water Bath
Dry Storage
Ice Cream Section
Regulating Valve

Fig. 15—A second method of refrigerating the Syrup rail by Frigidaire in which an expansion valve was inserted in one end of the syrup line and the other end fed liquid to the ice cream section boiler.

fully, you will see that the one ice cream boiler is being forced to carry practically the entire refrigeration load of the fountain.

Then came the thermostatic expansion valve, which created new possibilities in all lines. It was utilized in many ways, but the pressing need at the moment was for efficient syrup jar and storage compartment refrigeration and the new valve was used on that coil, first retaining float boilers in the ice cream and water bath; subsequently, the advent of the temperature actuated suction line valve, exemplified by the TRV valve, made it possible to use the thermostatic expansion valve to refrigerate a coil in the water bath, the temperature control valve successfully controlling the extent of the ice formation.

Our typical soda fountain then looked like this—a stub brine tank containing a float coil to refrigerate the ice cream; a direct expansion bare copper tube coil supplied by a thermostatic expansion valve; coiling in several turns the length of the syrup jar enclosure and several coils on the wall of the storage compartment to refrigerate those sections. A second thermostatic expansion valve supplying a bare copper tube coil around the sweet water bath tank, the suction line from this coil passing through a TRV valve to the suction line. The bulb of the TRV being located in the water bath tank at the farthest point of advancement of the ice formation. The condensing unit still was Sulphur Dioxide and controlled by a low pressure control.

Sulphur Dioxide had begun to encounter some serious opposition by the proponents of Methyl Chloride, but the business remained largely Sulphur Dioxide until Frigidaire adopted Freon.

Freon did not act very well in float boilers, and in addition there appeared a very decided tendency in the refrigeration business as a whole to go to direct expansion refrigeration and to eliminate brine and brine tanks as much as possible.

This, however, brings us up to the present time, and the parallel fails, so we must deal with the individual manufacturer.

The Russ Soda Fountain

The Russ Soda Fountain passed through an interesting stage, perhaps made necessarily different by the fact that this manufacturer made use of the sliding tray system, in which the brick ice cream compartment was in the bottom of the cabinet, the bulk cream being carried in trays accommodating 2—2½ gallon ice cream cans.

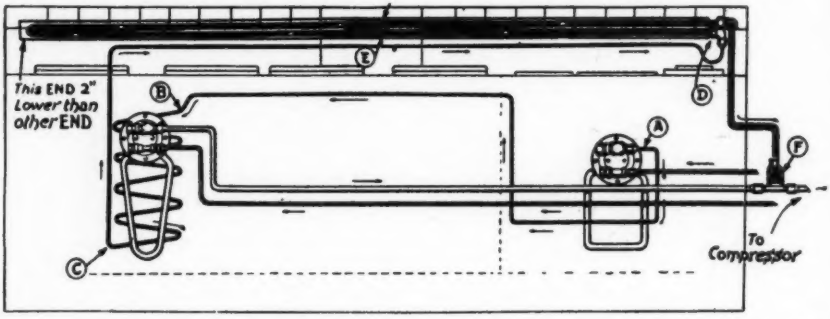


Fig. 16—The main operating characteristic of this system is that the warm evaporated gas from the coil (A) in the storage section is passed into a recondensing coil (B) to (C) submerged in the brine of the ice cream cabinet to be cooled and recondensed into liquid, which in turn is passed into the syrup jar enclosure (E) to absorb the heat of the syrups.

With that method, a lower temperature on the bottom of the ice cream cabinet was not objectionable, even desirable; so Russ built a fountain using a narrow full depth brine tank lining both sides and ends of the cabinet without partitions and with a bare copper tube coil inside the tank controlled by a thermostatic expansion valve. The fountain was also equipped with a direct expansion sweet water bath tank for water cooling and a direct expansion bare tube coil for cooling syrup jar rack and storage compartment, making three thermostatic expansion valves.

The method of temperature control was unique. On the first models a ⅜ inch ori-

fice solenoid valve was installed in the low side coil at the exit point of the TEV before the coil entered the brine tank. This solenoid valve was controlled by a small temperature control, the bulb of which was located in the ice cream compartment; thus the flow of refrigerant to that compartment was independently controlled.

A similar solenoid valve and cold control arrangement were used on the sweet water bath coil and the condensing unit was operated by a low pressure control.

On later models the solenoid valves were moved to the end of the low side coil in each case rather than the beginning and they were installed on the outside of the cabinet where they would be warm and dry, and the brine was eliminated, substituting an asphalt preparation. The method of coil winding was novel and is described in the June issue of this Journal.

(To be continued)

The Question Box

Readers are invited to send their problems pertaining to the servicing of household refrigerators and small commercial refrigerating equipment as well as oil burners to "The Question Box."

MORE ON QUESTION 362

IN the March 1940 issue of your magazine the question was asked, "How can the capacity of a capacitor be computed?" The following formulas will be found to have value in answering the question.

The capacitance in microfarads is $\frac{159300}{\text{frequency}} \times \frac{\text{amperes}}{\text{volts}}$. For the special cases of 60 cycles, 25 cycles, and 50 cycles, the first term, $\frac{159300}{\text{frequency}}$, is 2655, 6372, and 3186 respectively.

This formula given is only applicable where the capacitor has a low power factor, or where the heat losses in the capacitor are small. However, even if the power factor is as high as 25 percent the error in using the above formula is only four percent.

G. H. Fett, Instructor
University of Illinois

CAPACITORS

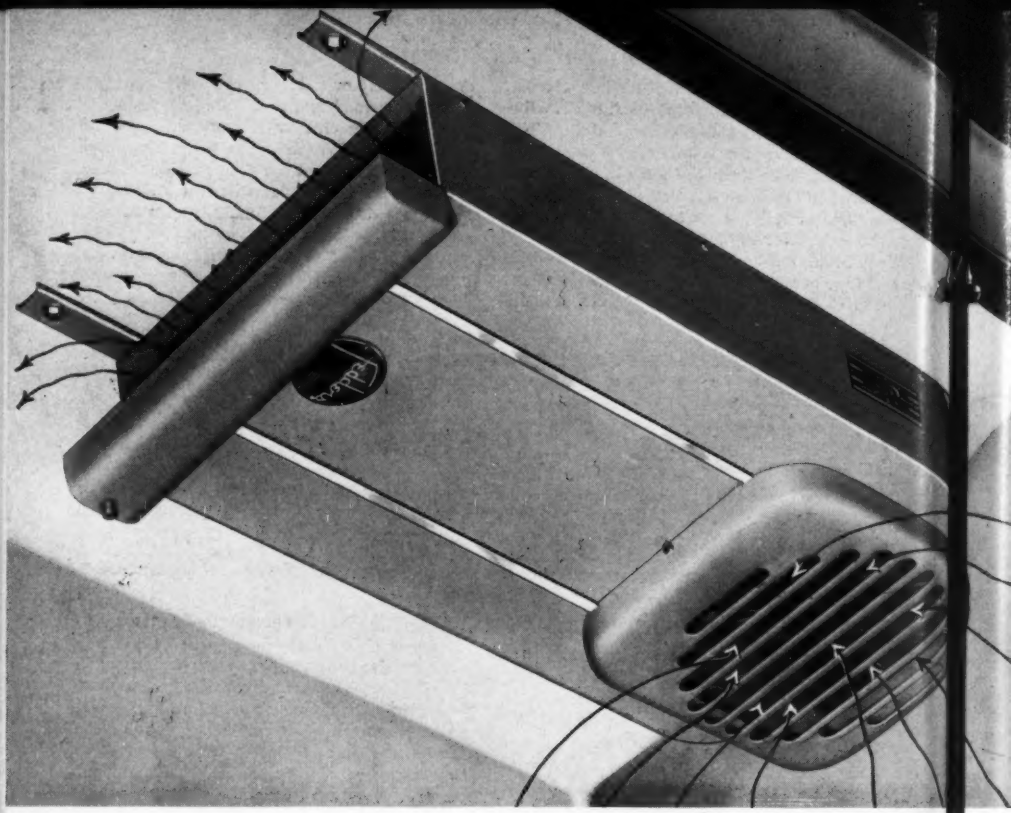
QUESTION 367: Mr. Kahn in the July issue of THE REFRIGERATION SERVICE ENGINEER states that the maximum capacitor voltage during starting period for a 120-volt motor is 138 volts. What will be the maximum capacitor voltage during the starting period for (a) 220-volt 60 cycle motor, and (b) 220-volt 50 cycle motor?

I read in THE REFRIGERATION SERVICE ENGINEER of a device made up with a hand regulated valve for testing an expansion valve without removing same from the installation. I searched in all magazines of this and last year's, but could not find it.

ANSWER: We forwarded your question concerning capacitors on to Mr. Kahn, and his reply follows:

"The voltage mentioned in the first question of your letter is the maximum allowable voltage across the capacitor during the starting period, and the majority of single phase condenser start motors are so designed so that this voltage is not exceeded at any time. Therefore, in determining the proper size capacity, we can assume that when the voltage across the capacitor is less than 188 volts and the torque is sufficient to bring the motor up to speed in less than 1 to 3 seconds, that the proper sized capacitor is being used. For a 220 volt, 60 cycle motor the maximum voltage across the capacitor will be approximately 275 volts. The same is true for the 50 cycle capacitor."

In regard to your second question concerning the testing of expansion valves without removal from the installation, I can't recall any information on this subject ever being published by this office and a search through our back copies fails to reveal anything on it. Therefore, I am at a loss to know where you have seen it or just what the method is.



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CROSLEY REFRIGERATOR

QUESTION 368: I have been servicing several Crosley household refrigerators with capillary tubes, and have trouble with one. This unit has been sent to the distributor and overhauled, a new capillary tube being installed six months ago. The first call I made on it I found the evaporator frosted only part way up and I added refrigerant SO_2 to bring the frost to completely cover the evaporator. It ran a couple of days fairly satisfactorily, then began defrosting and vibrating until the unit would strike the top. I put the gauges on and the head pressure was 80 pounds, while the back pressure was 15 pounds. I let it run a while and it began frosting and it would pull down to 3 pounds back pressure but wouldn't drop farther. It would frost but wouldn't cycle. I then brought the unit to the shop and installed a new suction valve and flapper valve, and after completely discharging the system I added oil to about one-half inch below center of crankshaft, then began adding SO_2 (charge calls for less than 5 pounds of SO_2), and added until frost completely covered evaporator and about 3 inches on suction line. It ran for several days, then began defrosting again as it did at first.

I feel that I have the amount of refrigerant as it should be, for as the frost began to come up to the top of the evaporator I only added two or three ounces each time, giving it plenty of time to settle.

I have been very careful to keep moisture and air out of the system and when I discharged the unit I also dehydrated it. I am at a loss to know what to do now. What is the correct oil level? and how do you determine the correct amount of refrigerant?

Can my trouble be in the capillary tube? I have found since I took the unit back to the customer the head pressure will rise as the evaporator defrosts. Could it be oil being thrown out of the compressor and holds the pressure while it is passing through the capillary tube, and then settles down and frosts a while until some more oil is thrown over? Any information will be greatly appreciated.

ANSWER: From the description of the complaint and the service made on the unit, there are apparently two possible causes for trouble. Either the unit is overcharged with SO_2 or the unit has been short of SO_2 for some time and the evaporator has become overloaded with oil.

The correct gas charge is indicated by a

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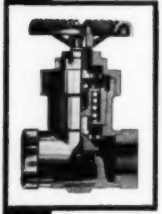

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frost back of about three inches on the suction line from the evaporator.

The correct oil charge for the compressor is 10 ounces. In the event the evaporator is overloaded with oil, this can be returned to the compressor by successive overcharging until the frost line remains constant.

CAPILLARY TUBES

Question 369: In the August issue of The Refrigeration Service Engineer there appeared an article on the capillary tube system of refrigeration. I would like to know if it would be practical to use capillary tubing to convert old dry expansion systems. It seems to me that it would result in a great increase in efficiency and a saving in not having to bother with the old liquid receiver. If this is practical, could you furnish me with any information as to the proper size and length for average domestic boxes? I do not recall ever seeing capillary tubing advertised. Can it be bought?

Answer: I am not so sure that changing an expansion valve system over to a capillary tube system will give you a greater efficiency, nor am I so sure that the cost will be less.

There are certain characteristics about a capillary tube system which will tend to increase the efficiency; however, there are other characteristics which will tend to decrease the efficiency. Therefore, one will probably offset the other and no gain will be experienced. On the other hand, due to the difficulty in determining the proper capillary tube size and to the fact that in service work no two systems will be exactly alike there is a great possibility that the efficiency will be considerably decreased.

This difficulty in determining the proper size tube may also entail considerable loss of time which though the cost of the tube is very low would make the total cost of the change-over much higher than when replacing the worn out expansion valve with another of the same type.

In determining the size and length of capillary tube to be used in any system it is necessary to balance the amount of refrigerant that will pass through it against the pounds of refrigerant required to be circulated per a given length of time.

This involves quite lengthy and complicated calculations, together with some test, such as the calorimeter test to determine the exact capacity of the unit.

On the other hand, it is possible to determine the size and length by the trial and error method, starting out with a good guess based on experiences in that type of work.

In this case it would be necessary to start with anywhere from 10 to 25 feet of tubing, dependent on the size of the unit, and gradually reduce the length until the proper operating conditions are secured.

Capillary tubing may be purchased from most jobbers and you will find it listed there in the two outside diameter sizes of .095 and .125 inches.

IF YOUR RECOMMENDATIONS ARE NOT ACCEPTED

Question 370: I have a somewhat complex problem and in order to give you the details I will tell you the whole story so that you may understand the situation of the refrigerator and the work that was done on it, yet it is still not operating correctly. I wish to ask your view of the whole thing as you see it from the following story as I told the owner that what I thought he wanted was a full factory service job.

This set is a Bastian & Blessing ice cream freezer and cooler with a container unit. This set was in a building that had been on fire and the water was shut off when it then melted the soft plug in the receiver tank due to the heat of the refrigerant and not from the fire, as it was not in the fire directly but in the same building. When the plug melted this opened the receiver tank and as the water running out of the building ran past the refrigeration set the hole was covered with water so some of it ran into the receiver.

This part was told me as I was not called to the scene until later. The fellow who worked on the set did not tell me just what had been done, but when I was called they were operating the compressor but were short of MC gas so I was called to bring some that I had and was asked to help in getting the machine to operating correctly. I worked for two days thawing out the expansion valves and installing dehydrators before much was done toward having it operate correctly. I wanted to blow out all the coils but was refused permission.

After this, the set operated fairly well but not just exactly right, as the oil would get awfully black in a few days' operation. Another man came along some time later and the job of overhauling the compressor was

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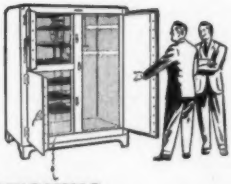

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given to him, with new oil put in. This was all right for a short time, but a few days later I was called to the scene again as the expansion valves would not operate right—they seemed to stick, and at a slight tap they would operate again either open or closed, as they should be, as by the gauges the valves are automatic expansion valves. After watching the machine and cleaning out the valves by taking them off, I watched it for several hours and it operated satisfactorily, but in the course of time another man was called as the valves failed to operate as they should on the freezer, which cools down the cream while making to about 24-26° F., and the cooler was kept to about —18° F.

The results of this were not learned, but another valve was installed, a thermostatic controlled, on the freezer unit, but later I was again called to the scene and this valve failed to operate and the one on the cooler was doing all right. I worked all day cleaning out the valves, and when started it operated satisfactorily the rest of the day and I then left, but not saying the machine was all right.

Replaced Valve

A few days later I was again called as the valves failed to operate, so then, having an automatic valve of the same make and size as the one on the machine, but reconditioned, I put it on the cooler and it seemed to cure the trouble. While cleaning out the old valve, the oil and other liquid which came out of it, including some water which I took to be sweat as the valve was all ice when removed, was a black-looking liquid and had a very peculiar odor somewhat like burned wood.

I wanted to install new valves but was refused permission. I then recommended cleaning the whole system and installing new valves, but was likewise refused, so I left it operating all right, but not satisfactory to me.

A day or so later I again entered the place (had not been called), and found the valves had been readjusted, and they said it was not operating correctly. The control adjustment which regulates the temperature was out of adjustment and I asked him what this was all about, so he said that it had not been operating and he had attempted to adjust it himself. I had suspected this at other times but was not sure, so when all this happened I just advised him that I was not the man to do the job and that I thought the best thing to do was to have a factory service job to make the refrigerator unit operate correctly, as I know the factory does not fool around but puts in the parts and dehydrates the set.

What is your opinion on this set? What do you think was wrong and was I right in my suggestion, or not?

If a refrigeration unit was cleaned out by using CO_2, would it make any difference what kind of refrigerant was used for refrigeration gas afterward? The article "Servicing Ice Cream Cabinets," by Everett J. Newcomer, is not clear on this so I wish that I may be given information on this operation in full detail if possible, and the refrigerant to be used.

Do you think that Ice-X would be a relief for my story and trouble on the cabinet, that is, at least temporary, as I had such a time with it and was not allowed to do as I wished?

ANSWER: In the first place, when dealing with a customer of this kind I believe I would be inclined to have an understanding with him as to who was going to do the job and who would be responsible for it. Undoubtedly when two men are working on a job alternately and with no cooperation between them, it will be very difficult to accomplish any good.

No Customer Cooperation

In the second place, evidently you had the right idea when you started on the job but the customer refused to give you permission to follow through on your recommendation, and since that time you tried to worry along with it and keep it operating as best you could, whereas it would probably have been better had you made your recommendations and stuck by them to the extent that you would have refused to do any other work until your recommendations were carried out.

Without doubt the entire trouble on the machine is that it contains moisture in rather large quantities and this moisture has caused carbon and sludge to form in the system so that now it is thoroughly contaminated all the way through.

Ice-X would help considerably in overcoming your trouble at the valves but I am inclined to think that this would require too large a quantity of Ice-X because there is so much moisture in the system. Apparently the only remedy for the system at this time is to entirely disassemble it, washing and cleaning all parts in carbon tet and thoroughly drying them before reassembling.

After this is done it would not hurt it to add Ice-X. The amount recommended by

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the manufacturer is best. This would overcome the effect of any moisture still remaining in the system.

Of course, it is too late to do much about it now, since you state you have given up the job and advised the customer to go to the manufacturer for a thorough overhaul. But, the above is merely my opinion in view of the entire case as you have stated it.

It is sometimes difficult to deal so harshly with a customer, particularly when you are in competition with someone else, but this particular case is a good example which proves its value.

F. A. Hughler
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Using a Vise as an Arbor Press

By JACK JOSEPHSON
Bridgeport, Conn.

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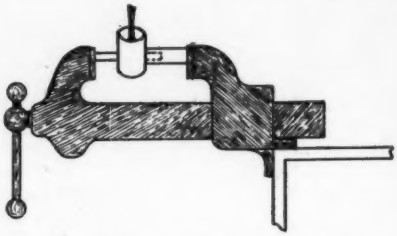

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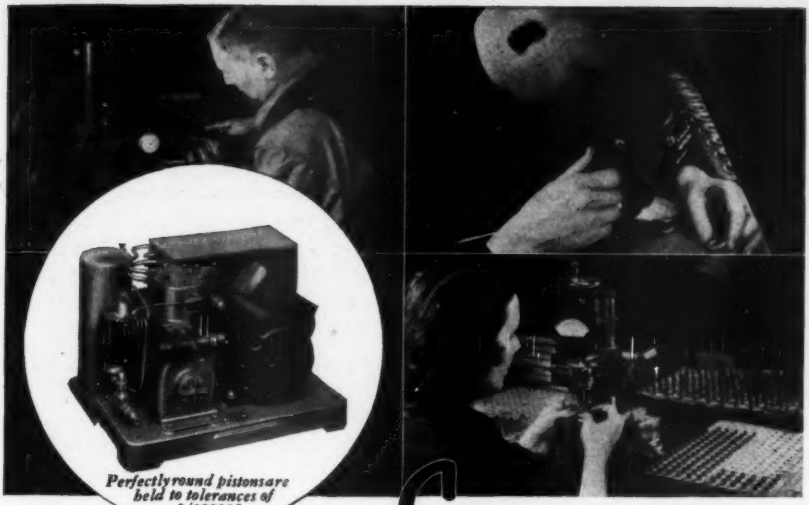

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(Continued on page 48)

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PONY EXPRESS CHAPTER, ST. JOSEPH, MO.: President, W. B. Nichols, 501 Felix St., St. Joseph; Secretary, E. J. Storm, 2815 Felix St., St. Joseph.

ROCKFORD CHAPTER, ROCKFORD, ILL.: Meets 3rd Monday. President, E. J. Seaton, R. 2, Colonial Drive, Rockford; Secretary, R. M. Shipman, 2505 W. State St., Rockford.

ST. LOUIS CHAPTER, ST. LOUIS, MO.: Meets 2nd and 4th Thursdays. President, A. H. Huhn, R. R. 1, Florissant, Mo.; Secretary, E. A. Plesskott, 2145—67th St., St. Louis.

SAN DIEGO CHAPTER, SAN DIEGO, CALIF.: President, H. E. Friedrichs, 2716 Frankfort St., San Diego; Secretary, Wm. McDowell, 312 W. Market St., San Diego.

SCRANTON CHAPTER, SCRANTON, PA.: Meets 1st and 3rd Tuesdays. President, William Franklin, 627 N. Washington Ave., Scranton; Secretary, Chris G. Hess, 321 N. Everett Ave., Scranton.

SIOUX CITY CHAPTER, SIOUX CITY, IOWA: President, Frank Kutil, 120 W. 4th St., Sioux City; Secretary, H. R. Eriksen, 1622 W. 20th St., Sioux City.

SPRINGFIELD CHAPTER, SPRINGFIELD, ILL.: Meets 2nd and 4th Wednesdays. President, F. W. Nichols, 314 W. Grand Ave., S., Springfield; Secretary, Edw. P. Greig, 223 E. Adams St., Springfield.

TALL CORN CHAPTER, CEDAR RAPIDS, IOWA: President, R. R. Koepsell, 618 First St., S. E., Cedar Rapids; Secretary, H. H. Ulish, 1500—2nd Ave., S. E., Cedar Rapids.

TOLEDO CHAPTER, TOLEDO, OHIO: Meets 2nd Wednesday. President, F. A. Rudolph, 2831—131st St., Toledo; Secretary, Leo Davison, 420 Kenilworth Ave., Toledo.

(Continued on page 50)

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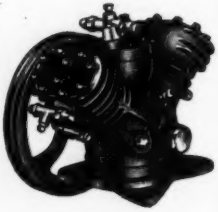
They will be replaced in two ways—1st, by new refrigerators, on which you make no profit; 2nd, by "CHIEFTAIN" REPLACEMENT COMPRESSORS AND UNITS, on which you make large profits. Are you getting your share of this business?



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TRENTON CHAPTER, TRENTON, N. J.: President, Wm. E. Aaronson, 224 Ardmore Ave., Trenton; Secretary, F. W. Homeier, 858 Melrose Ave., Trenton.

TRI-COUNTY CHAPTER, ELGIN, AURORA and JOLIET, ILL.: Meets 1st Friday. President, Willis Stafford, 213 Jackson St., Aurora; Secretary, C. C. Stumpf, 687 Dundee Ave., Elgin.

TRI-STATE CHAPTER, HUNTINGTON, W. VA.: Meets 1st Monday. President, J. A. Cottle, 2726 First Ave., Huntington; Secretary, A. W. Albertsen, 206 Eighth Ave., W., Huntington.

TWIN CITIES CHAPTER, MINNEAPOLIS and ST. PAUL, MINN.: Meets 2nd Tuesday. President, Wm. V. Warner, 959 Fuller Ave., St. Paul; Secretary, W. E. Gleb, P. O. Box 3332, St. Paul.

VULCAN CHAPTER, BIRMINGHAM, ALA.: President, Sandy Nelson, 5129—8th Ave., S., Birmingham; Secretary, E. D. Gothberg, R. 2, Box 225a, Birmingham.

WESTERN MASSACHUSETTS CHAPTER, SPRINGFIELD, MASS.: Meets 2nd and 4th Wednesdays. President, C. A. Adams, 872 Main St., Springfield; Secretary, H. C. Lambert, 31 Elm St., Springfield.

WICHITA CHAPTER, WICHITA, KANSAS: Meets 1st and 3rd Fridays. President, Frank H. Richards, 706 Pattie, Wichita; Secretary, E. F. Rhodes, 733 S. Washington, Wichita.

WINNIPEG CHAPTER, WINNIPEG, MAN., CANADA: President, J. B. Shepherd, 494 Clifton St., Winnipeg; Secretary, R. F. Castling, 181 Burrin Ave., West Kildonan, Winnipeg.

WOLVERINE CHAPTER, LANSING, MICH.: President, O. S. McGuffey, 1812 N. Genessee Drive, Lansing; Secretary, G. G. White, 224 N. Jenison Ave., Lansing.

WORCESTER CHAPTER, WORCESTER, MASS.: Meets 1st and 3rd Tuesdays. President, S. B. Garland, 32 Neptune Road, Worcester; Secretary, Thomas H. Cronk, 15 Perkins St., Worcester.

WYOMING VALLEY CHAPTER, WILKES-BARRE, PA.: President, F. M. Schultz, 161 Sambourne St., Wilkes-Barre; Secretary, E. E. Swank, 162 Lee Park Ave., Wilkes-Barre.

YOUNGSTOWN CHAPTER, YOUNGSTOWN, OHIO: President, M. Bokesch, Sr., 2328 Mahoning Ave., Youngstown; Secretary, Roy Keith, 94 E. Chalmers Ave., Youngstown.

Chapter Notes

Under this heading will appear news of the chapter meetings. For names of the officers and dates of regular meeting nights, please refer to the Chapter Directory.

ILLINOIS R.S.E.S. PLANS FOR STATE MEETING AND PICNIC

PRESIDENT R. C. McCARTHY of Rockford, Ill., met with his Board of Directors of the Illinois Association of the Refrigeration Service Engineers Society on Sunday, May 5th, at LaSalle, Ill., to discuss plans for the third annual state convention and a state picnic.

Tentative arrangements were made, and advance publicity plans considered for the third annual convention, to be held in the Jefferson Hotel at Peoria, Ill., October 19 and 20. Final plans will be anounced at a Board of Directors meeting, to be held June 16 at Starved Rock.

A state picnic, with all Illinois chapters participating, has been arranged for Sunday, July 28. The picnic will be held at Starved Rock, and events are being planned to appeal to every one.

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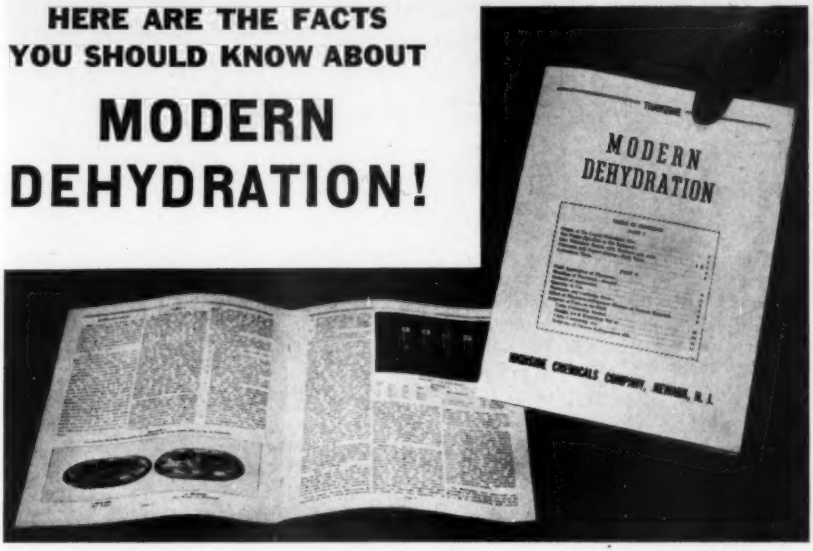

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Mr. A. D. McGill of Peoria, Ill., has been appointed General Convention Chairman for the third annual convention.

S S S

O. R. IRWIN, KANSAS CITY

OREN REECY IRWIN, second vice president of Kansas City chapter passed away at his home on May 5th. He was the owner of the Irwin Refrigeration Service. He is survived by his wife, Mrs. Lila Mae Irwin and a son Oren Robert, as well as his parents Mr. and Mrs. J. B. Irwin and a sister and three brothers. Mr. Irwin was active in the affairs of the R.S.E.S. and his many friends will regret his untimely passing. He was 47 years old.

S S S

CENTRAL NEW YORK CHAPTER

April 22—An election of officers was held, the following being elected: Fritz Harder, *President;* Francis Mackin, *Vice President;* Henry Jenda, *Secretary;* Paul Cross, *Treasurer.*

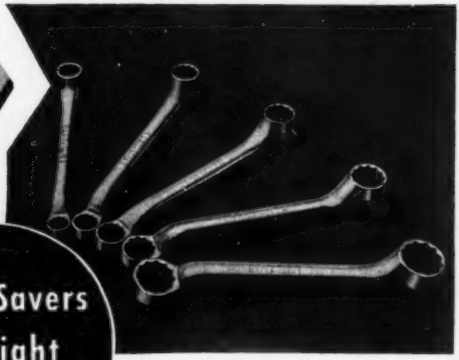
Mr. Harder was installed as the presiding president, and appointed Mr. Glou as chairman of the educational committee. A motion was made and carried to change the meetings to the second and fourth Wednesdays during the summer months. A motion was also made and carried that the chapter pay the secretary's membership dues.

CHICAGO CHAPTER

April 9—K. B. Thorndike of the Detroit Lubricator Company was introduced, and after a few remarks, introduced L. O. Grauer and T. C. McKee of the same company. Mr. McKee opened the program with a thorough explanation, aided by blackboard drawings, of the new Dura-Fram vapor-charged valve. While the subject is a technical one, it was explained in such terms as were easily followed and digested. Following Mr. McKee's talk, Mr. Thorndike presented a 45-minute sound slide film on the operation and application of the expansion valve, and Detroit's 450 Series Meat Box Control. Mr. McKee took over once more after the film had been shown, and gave a further explanation of the expansion valve, finally answering questions.

Returning to business of the evening, Mr. White thanked Detroit Lubricator for the presentation, then appointed Arnold Schroeder and Fred Old as a committee in charge of bowling, with instructions to keep a record of bowling scores during the bal-

SPECIALIZED TOOLS for REFRIGERATION WORK



When nuts are close together—when bolts protrude—whenever you're in a "tight corner" and need speed—these slim-shanked, Dwarf Boxockets save valuable time—do better work. The thin-walled Boxocket head slips in most anywhere—the offset handle passes most any obstruction. And the six-point Boxocket grip on the nut multiplies turning power—gives you safe, non-slip leverage with only 30° handle movement. Snap-on Dwarf Boxockets are made in 12 nut sizes—2 sizes per handle—covering the entire range of refrigeration requirements from 3/8" to 13/16".

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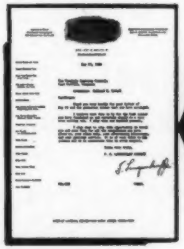
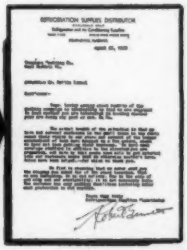
HERE'S WHAT VIRGINIA JOBBERS *Actually Say—*



"I also want to take this opportunity to thank you and your firm for all the cooperation you have given us, your sales help, your advertising literature, and your personal service. It is of real value to us jobbers and we do appreciate this in every respect."

"... We have had several customers in the small towns in the state renew their visits to our store and several of the larger accounts out of town have dropped us a few orders, where we have not been getting their business ... for which we thank you."



These two letters were among many received from Virginia jobbers, expressing their appreciation of a special promotion put on by Virginia. Just another example of Virginia's *extra* service.

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WEST NORFOLK — VIRGINIA

V VIRGINIA

April 9 was Detroit Lubricator night at the Chicago Chapter and Irving Alter of the Harry Alter Co., attended with his camera. Pictured at the right are the Detroit representatives who aided in the show. Left to right they are: T. C. McKee, K. B. Thorndike, I. J. Knudson, Dan Gott and L. O. Grauer.

ance of the season, which might be used next year as a guide in selecting teams to represent the chapter.

April 23—J. G. Praetz of the Liquid Carbonic Corporation presented an extremely interesting discussion, aided by projected slides, on the refrigeration system, its load conditions, installation, adjustments, and servicing, on both the Lifetime fountain and the Simplex soda fountain. He also explained at some length the construction, operation, and servicing of carbonators, winding up with an open discussion and question period. The entire talk required about two hours, which was broken midway with a recess, during which beer was served and the seventy-five men in attendance were given an opportunity for stretching. Mr. Praetz requested that someone be asked to operate the projector for him, and because Mr. T. C. McKee of Detroit Lubricator was the only one present with experience on these machines, he was asked to be the operator. Mr. McKee accepted, and even though it was found that the Liquid Carbonic fountain was not equipped with Detroit's Dura-Fram valve, he carried his job through to perfection.

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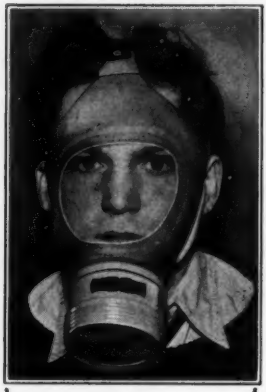

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FURNITURE CITY CHAPTER

April 6—This meeting was in the form of a dance, held at the American Legion Hall near Johnston Park. The music was furnished by Scotties Serenaders, and Peggy Scott entertained with her song and dance. Square dances were requested and Mr. Lowell Scott called. The door prize, an eight-tube Zenith radio, was won by Mr. Ernest Hoop.

April 11—The meeting was called to order by President Wilbur, and a report given by the Educational Chairman, Mr. Cummings. It was reported that the dance on April 6 resulted in a profit for the treasury. It was decided to have a questionnaire, and Mr. H. Scott moved that ideas for educational features be placed in the questionnaire. The remainder of the evening was turned over to the Question Box and a lively discussion followed.

CANADIAN CAPITAL CHAPTER

April 19—The meeting was held at the Gatineau Country Club for the presentation of the charter to the local chapter. Seventy-two members were present at the banquet and charter presentation. Mr. G. A. Burns, National President, explained the purpose of the R.S.E.S., after which the oaths of membership were taken by the members, and the charter was presented by Mr. Burns to C. Pinke, President of Canadian Capital Chapter. The meeting then adjourned to the main body of the Club where dancing was enjoyed by everybody.

DAYTON CHAPTER

March 20—Dusk was falling when the chapter gathered in the ultra-moderne lounge of Frigidaire's Moraine City plant for the inspection tour arranged by our genial secretary, George O. Snyder. The 247 members and associates represented delegations from Cincinnati, Columbus, Eaton, Hamilton, Lima, Middletown, Piqua, Richmond, Troy, with Dayton members in the role of hosts.

A delicious dinner was served in the newly decorated, air-conditioned dining hall. Cigars and cigarettes were distributed after dinner, and this gave us ample time to relax and enjoy our sumptuous repast. We then assembled in the auditorium and were welcomed by our dapper president, Ray J. Brown, Piqua, Ohio. A. W. Gruber, Ironton, Ohio, National Board of Directors and Regional Director, greeted the audience, and was given an ovation at the close of his brief but extremely interesting talk. Frigidaire had prepared two sound movies, one on refrigerators, and the other on electric ranges,

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and these were received with much interest and were enjoyed by all those present.

After the movies, we were escorted in groups of approximately thirty by courteous, efficient Frigidaire engineers to inspect this famous plant. Those of us who had the opportunity of visiting this particular plant were awed by the efficient, smooth operations of the many assembly lines. Of course, our engineer guides were kept busy answering many questions and explaining the various operations as we trudged by. After what seemed like miles of assembly lines to us, we finally reached the starting point, a little tired, but much wiser in the art of building up-to-the-minute mechanical refrigerators.

March 29—President Ray J. Brown, Piqua, Ohio, opened the meeting with a short welcoming address and introduced Ted Coggin, everybody's friend, and his worthy colleague, Franklin J. Carter. A rousing stump speech was given by Harold Shoupp, Troy, Ohio, chapter director of education, on the advantages of being a member. This was undoubtedly the best talk on the subject we had heard for sometime. It was very evident immediately afterwards when our stogie-smoking secretary, George O. Snyder, received fourteen applications for membership.

The next event of the evening was a movie by the Detroit Lubricator Company on their new line of Dura-Fram expansion valves and other Detroit Lubricator refrigeration items. The movie was very interesting, and especially were the explanations given by these two recognized engineers.

After the regular business was disposed of, refreshments were served. The amber fluid flowed smoothly, and of course frequently. Many were the toasts, many the songs that only joyful hearts could render, all of which added to the merriment. However, there is a time when all good things come to a close, and so we all departed to our various hearths, thankful that Ray J. Brown, President, had arranged such a delightful meeting.

President Brown Has New Arrival

President R. J. Brown had an acceptable excuse for his absence at one of our recent chapter meetings. Mr. and Mrs. Brown announced the arrival of a new daughter.

LOS ANGELES CHAPTER

April 10—The meeting was turned over to J. C. Blair, who introduced Howard H. Campion. Mr. Campion gave an exceptional and inspiring talk on "Who's Your Cheer

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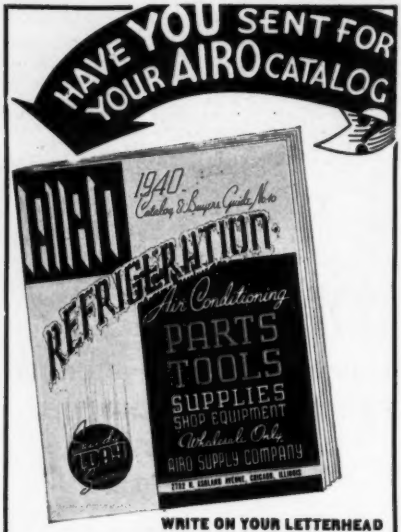
Leader." The educational feature of the evening was conducted by Mr. Blair, and consisted of an inspection of the G. E. hermetically sealed unit, and a discussion on field and shop data on the G. E. The unit was furnished by the National Society, and proved to be an interesting topic for the evening.

LOS ANGELES CHAPTER BANQUET

The Los Angeles Chapter held its annual dinner dance at the Potrero Country Club, March 30. A few of those in attendance are shown in the left-hand column. Left to right they are: (1) Willard Koenig, Mrs. John Payne, J. C. Rodgers, President John Payne, Mrs. C. Bartlett; (2) J. C. Blair, Mrs. W. B. Decker, Mrs. Paul Kiefler, Paul Kiefler, W. B. Decker; (3) one end of the banquet hall.

ATLANTA CHAPTER

April 22—After a short business session, the president, Sam Mayfield, introduced the speaker of the evening, Mr. E. V. Dunbar. Mr. Dunbar is a well-known manufacturers' representative in the area, and chose Ranco controls as his subject for discussion. After showing a movie of the Ranco plant and its manufacturing methods, Mr. Dunbar explained in detail the construction of Ranco controls and their application to various refrigeration problems. Moving pictures, taken by Herman Goldberg, of the All-Industry Convention in Chicago were shown next. This also proved to be of interest.



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NIAGARA FRONTIER CHAPTER

April 19—Under the good and welfare of the chapter, a discussion arose on the matter of providing the chapter with seals and emblems which could be rented to members of the chapter. Mr. O'Hara and Mr. Schuster donated seals and emblems to the chapter for this purpose, and it was decided that a charge of 25c for the first seven days would be made to each member for the loan of these seals, and that a charge of 25c per day for every day thereafter be made. It was decided that this arrangement should be incorporated in the Chapter by-laws.

JOINT MEETING OF BOSTON, SPRINGFIELD AND WORCESTER, MASS. CHAPTERS

April 2—The meeting was opened by S. B. Garland, President of the Worcester Chapter, who introduced it as the first joint meeting of its kind between the chapters represented. The secretaries of the various chapters were asked to keep notes for the benefit of their individual chapters. The president of the other chapters were introduced, then Mr. Garland outlined the business to be conducted.

The first item was the matter of codes to govern refrigeration service within the state. Opinions of the various representatives were called for, and many helpful ideas were brought out. However, no definite action was taken at this time, with the exception that a committee was appointed to look into the matter further. Another point of business was the matter of cooperation between jobbers, distributors, and service organizations, and in the discussion that followed, both jobbers, distributors, and manufacturers threw considerable light on the matter. The possibility of forming a New England Chapter was the next point of discussion, and it was the consensus of opinion that such a move would be desirable. Further action on this matter was referred to a future meeting.

There was a short entertainment following the meeting, and refreshments were served, the expenses of which were defrayed by the members partaking.

BOSTON CHAPTER

April 16—After some discussion it was decided that future meetings of the chapter would be held at the Aurora Hotel, and Mr. Goodney stated that he would personally explain to the Hotel Lennox the reason for the move, and thank them for their past services. Some discussion arose as to ways and means of improving attendance at the chapter meetings, and all members were in-

structed to contact visitors and others in an attempt to increase the membership.

MONTGOMERY CHAPTER

April 4—The evening was devoted to discussing the drawing up of a license for refrigeration men, and to discussing the advantages and disadvantages of such a license.

TRENTON CHAPTER

April 1—A banquet in honor of the presentation of the charter by H. T. McDermott, National Secretary, was held on this date. President Aaronson accepted the charter on behalf of the chapter, following which Mr. Jaeger, toastmaster, introduced

CHARTER PRESENTATION AT TRENTON
Top—Shows general view of members attending banquet. Bottom—President Wm. E. Aaronson receives charter from National Secretary McDermott.

Mr. Herman Spoehrer of the Spoehrer-Lange Company, St. Louis, who gave an illustrated lecture on Sporlan thermostatic expansion valves and Solenoid valves.

MONUMENTAL CHAPTER

March 13—There were approximately one hundred in attendance at this meeting, at which R. Townsend displayed the sound pictures portraying methods of manufacture, inspection, and assembly of the Detroit valve and other controls. The meeting was then turned over to R. L. Stevens of Detroit Lubricator, who gave further information on the construction of the Dura-Fram valve and answered many questions.

April 12—The meeting was turned over to R. B. Stevenson of the Silica Gel Department of The Davison Chemical Corporation. Mr. Stevenson proceeded to give a very interesting illustrated lecture on the reaction of moisture in refrigeration systems, and the reasons for copper plating, sludging, and corrosion. He then traced the history of dryers from way back in the dark ages of refrigeration up to the present time, outlining the objectionable features of each. With the assistance of Mr. Edmunds and elaborate equipment especially built for demonstration purposes, he proceeded to demonstrate the effectiveness of Silica Gel as a drying agent.

Refreshments were served following the meeting, and an enjoyable social evening was had by all.

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LONG BEACH CHAPTER

April 4—Among the correspondence read on opening the meeting, was a letter of thanks from Mrs. Voorhis for the roses they sent her upon the arrival of a new son.

Mr. E. F. Brown, educational chairman, also thanked the chapter for flowers sent him during his sickness.

On the educational program, Mr. A. T. Riley gave an interesting talk on the G. E. unit display sent by the National Society. Each of the members present received a copy of the bulletin entitled, "Field and

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Shop Data on the G. E. Unit," and the contents were thoroughly discussed during the examination of the unit itself.

Refreshments were served following the meeting.

SAN DIEGO CHAPTER

April 11—The meeting was held in Slims Cafe, where chicken dinner was served prior to the business meeting. A moving picture was shown by Charles C. Corley, which was produced through the courtesy of the Hiram Walker Distilleries. The picture was most interesting, especially in regard to the scientific and accurate control of all phases in the manufacture of spirits.

A brief business meeting took place following the movie.

CLEVELAND CHAPTER

April 11—The meeting was devoted entirely to the program of the Minneapolis-Honeywell Regulator Company, who presented an illustrated lecture on various controls manufactured by the company. Refrigeration men from all parts of the territory were invited to attend, and the meeting reached sizeable proportions. Refreshments were served following the meeting.

April 25—With a large attendance present, the Detroit Lubricator Company took charge of the entire evening, presenting an interesting picture and talk on methods of manufacture, construction, and operation of the new Dura-Fram thermal expansion valve. The presentation proved very interesting to the meeting, and refreshments were enjoyed by all after adjournment.

TRI-COUNTY CHAPTER

April 5—After the business of the meeting was disposed of, a very interesting discussion was led by D. V. Clark and Harold Anderson on dryers and drying agents, the use of liquid and other types of drying agents, such as Silica Gel, Drierite, and Activated Alumina.

April 19—For the educational program of the evening, the meeting was turned over to the educational chairman, who conducted a quiz contest, which proved to be very entertaining and educational.

In discussing arrangements for the coming certificate membership examination, it was decided that the chapter should endeavor to secure space in the local school house where the examination could be held.

Announcement was made of a meeting to be held under the auspices of Detroit Lubricator Company on June 21, which promised to be of extreme interest.

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PHILADELPHIA CHAPTER

March 11—The question box made its initial appearance at this meeting, and all members were notified of its purpose. The discussions that arose from its initial appearance proved of considerable interest.

At future meetings, it was decided that the chapter would discuss the Society's lecture course in its entirety. The meeting was adjourned with a feeling that quite a bit was accomplished, and it was agreed upon by the body that all refrigeration men are invited to attend our meetings, held the second Monday of each month at 3048 N. Broad Street, Philadelphia.

April 8—Due to inclement weather, the attendance of the meeting was very small, and after disposing of the small amount of business before the chapter, the meeting was adjourned.

MISSOURI VALLEY CHAPTER

March 21—President F. C. Haeberlein presided over the meeting, and after various business matters before the chapter were discussed and disposed of, the meeting was turned over to Mr. Lancaster, who conducted an interesting discussion on the ammonia accident which occurred in Council Bluffs. Such discussions are the means of creating greater care in like situations among the members of the chapter.

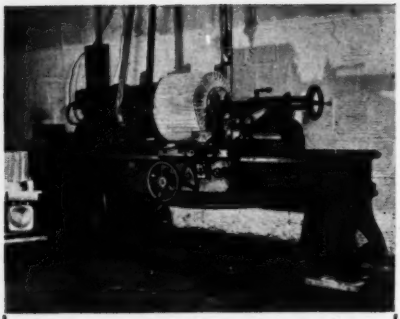
HUDSON MOHAWK VALLEY CHAPTER

April 10—The chapter held a banquet on this date in honor of the charter presentation, which was made by S. B. Garland of the Worcester, Mass. chapter. Geo. Gardner introduced Mr. Garland, who proceeded with the presentation, and gave an interesting talk on the benefits to be derived from membership in the association.

A movie film, taken by Herman Goldberg at the National Convention in Chicago, was shown following the charter presentation, and all those present found the showing very interesting.

ONTARIO FOREST CITY CHAPTER

April 5—The meeting was devoted primarily to the election of officers, and the following were elected: *President,* J. Yeddeau; *Secretary,* S. Kilmer; *Treasurer,* R. Wright; *1st Vice President,* A. Jenkins; *2nd Vice President,* A. Mallen; *Sergeant-at-Arms,* E. Koenig; *Board of Directors,* S. O'Brien, G. Glass, J. McGowan, W. Stone, E. Schott; *Educational Chairman,* F. A. M. Dawson; *Entertainment Committee Chairman,* W. Bevis; *Membership Committee Chairman,* E. Blake.



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KANSAS CITY CHAPTER

March 12—On the educational program for the evening, R. E. Meeker, in the absence of F. A. Thompson, read and discussed an article on copper plating, taken from the journal of Refrigerating Engineering.

March 29—This was a special meeting devoted entirely to the presentation by Mr. T. C. McKee of the Detroit Lubricator Company of a sound slide film portraying the construction and operation of Dura-Fram expansion valves and other controls manufactured by Detroit Lubricator.

A total of 113 attended the meeting, which proved one of the most interesting the chapter has held.

COLONELS CHAPTER

April 5—The meeting was held in conjunction with the Detroit Lubricator Company meeting at the Brown Hotel. President Tingle introduced K. B. Thorndike of Detroit Lubricator, who, in turn, introduced Mr. T. C. McKee. Mr. McKee proceeded with an explanation of the Dura Fram expansion valve, which was followed by a slide sound film on the construction and operation of these valves, and other Detroit products.

Beer and refreshments were served following the meeting through the courtesy of the Detroit Lubricator Company.

ST. LOUIS CHAPTER

March 28—E. Gygax introduced Mr. Jerry A. Wilkerson, a member of this chapter, who represents Henry Valve Company in this territory. He gave a most interesting talk on their new balanced action, packless diaphram valves, their dryers, and strainers. Announcement was made of feature attractions of future meetings, and the meeting adjourned.

TWIN CITY CHAPTER

April 9—The educational program of the evening consisted of a quiz contest in which all those present participated. The examination was a written one, with President Warner and his "brain trust" acting as judges and correcting the papers. A discussion followed on the questions, which brought out much interesting information. Mr. W. W. Dunn's name was drawn for the attendance kitty, but due to his absence, the amount was returned to the treasury.

COLUMBUS CHAPTER

April 11—G. E. Graff gave a detailed and interesting report of the proceedings at the Canadian Convention, and stated that there is real enthusiasm in the meetings, and that the relations between the service engineers and sales forces are very favorable,

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resulting in better cooperation. Announcement was made by the secretary of the educational features to be included in the meetings from now until May 26. There are many interesting programs to be presented in the next few meetings, and all members and visitors are urged to be present.

MISSOURI VALLEY AUXILIARY

April 4—During the business session of the meeting, Mrs. Lozier was appointed Chairman of the Entertainment Committee, to take care of the entertainment at the next meeting. The next meeting was to be designated as Golden Spike Celebration, and refreshments are to be served.

April 8—A dinner dance was held on this evening with a very fine dinner being served. Every one who attended had such a good time that it is hoped another one will be held in the near future.

KANSAS CITY AUXILIARY

March 12—Announcement was made of the birth of a baby girl to Mr. and Mrs. Leitner. Mrs. Thompson was appointed to select a gift and send it to the baby.

Kitchen shower gifts were presented to Miss Helen Smith by Mrs. Hoover, and all members were invited to attend the wedding on March 30.

FRIGIDAIRE TRAVELING DISPLAY.

Housed in the trailer pictured here is a new traveling display and demonstration unit recently placed in service by Frigidaire Division, General Motors Sales Corporation. The trailer will visit each of the rural electrification centers on the 1940 REA farm equipment tour itinerary which will take the trailer over a distance of approximately 10,000 miles this year where it will be seen by an anticipated audience of more than 300,000 persons. At each stop the Frigidaire trailer will be utilized by a factory representative to demonstrate the advantages of the company's electric refrigerators, electric ranges, electric water heaters and commercial equipment such as locker systems, drop-in milk coolers, milk storage rooms and other devices designed for use on the farm and in rural communities. When traveling between stops, the Frigidaire trailer is completely closed. To open it "for business," one side is lowered to form a platform extension of the inside floor, an awning is erected over the extension, and removable steps and railings are installed.

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Semi-steel, carbon-steel, double-seated stem, Angle and Globe type.

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Safety ball seats shut off liquid in case of glass breakage.

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Furnished filled with Calcium Chloride, Activated Alumina, or Drierite; and Silica Gel.

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Cylinder and Cone types, and liquid line scale trap.

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Compact in design, completely rust-proof, Angle, Tee and Globe types.

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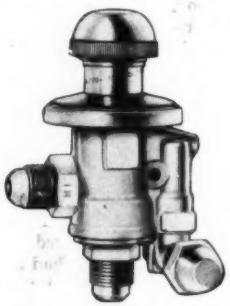
* * *

A-P SUCTION PRESSURE VALVE

THE Model 235 Suction Pressure Regulating Valve is one of several new products recently announced by the Automatic Products Company.

This valve is used on single installations to regulate the pressure at the tail of the evaporator. It permits the maintaining of the evaporator pressure at a desired level, regardless of changes in load or variations in suction pressure on the outlet side of the regulating valve. It is also frequently used where two or more evaporators are operating at different temperatures with a single condensing unit. The valve may be used on either flooded, semi-flooded or dry expansion systems, with either Freon, Methyl Chloride or Sulphur Dioxide.

The Model 235 valve is of the throttling type, tending to close off gradually as the



A-P MODEL 235 VALVE

evaporator pressure is reduced beyond a certain point. There is no sudden change to cause erratic operation of the balance of the system. As the load tends to increase the

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evaporator pressure, the valve tends to open wider. When the temperature begins to fall, the evaporator pressure tends to decrease, and the regulating valve begins to close again.

An exclusive feature found on this valve is the convenient pressure setting adjustment. On most types of pressure regulating or constant pressure valves, several hours are required before the system has settled down sufficiently to permit adjustment of the valve to the proper pressure setting. On the collar immediately below the adjusting knob on the Model 235 valve is a scale graduated in pounds pressure, ranging from 10" vacuum to 30 lbs. per square inch. By turning the adjusting knob to correspond with the markings on this collar, an approximate pressure setting can be secured immediately. Then, after the system has had an opportunity for settling down, exact pressure settings can be secured by means of a gauge. Gauge connections are furnished on the valve. According to the manufacturer's reports, the temporary pressure setting is accurate within a pound or two.

Additional information on this new A-P product can be obtained by writing direct to the Automatic Products Company, 2450 North 32nd Street, Dept. M, Milwaukee, Wisconsin.

* * *

NEW CATALOGS AND BULLETINS

FEDDERS MANUFACTURING COMPANY, Buffalo, N. Y., have issued a 51-page catalog featuring their complete line of wall, ceiling, and suspended type unit coolers, their Fed-R-Fin coils, and their complete line of expansion valves, constant pressure valves, and check valves.

The beautiful four-color cover design is in keeping with the smart styling and engineering of Fedders products, and the essential data it contains makes this catalog a handy working data book.

Announcement was made recently of the completion of a new Fedders plant at Owosso, Michigan, which will be devoted mainly to the production of automotive radiators and hot water heaters. The new plant more than doubles Fedders' previous capacity.

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Ranco, Inc., Columbus, Ohio, has issued a beautiful three-color folder, illustrating its pressure and temperature controls and their applications.

Intended as a mailing piece from the jobber or manufacturer to the service engineer, it provides a useful sales aid by bringing the attention of the buyer to the smart styling of Ranco controls.

The Imperial Brass Mfg. Co., 1200 W. Harrison St., Chicago, Ill., has issued a new 32-page catalog, showing in condensed form the complete line of Imperial Valves, fittings and tools for refrigeration and air conditioning.

Shown in the catalog for the first time is a new line of precision wrought copper fittings, many new flaring and bending tools, new inner and outer reamer, new capacity booster, coil spacer and support, by-pass tool, and many other new items. Also described and illustrated is the new Imperial triple-seal feature which now is being embodied in all Imperial flare fittings.

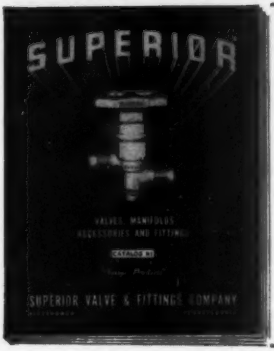
Important classifications of products covered are: shut-off valves, compressor valves, forged flare fittings, forged and wrought solder fittings, aluminum alloy fittings, brass pipe fittings, manifolds, dehydrators, strainers, tube working tools of all types, charging and testing units and soldering and brazing equipment.

A large number of price changes are included in the catalog which is designated No. 88-J. Copies may be obtained by writing to the manufacturer.

The Automatic Heating & Cooling Supply Co., 647 W. Lake St., Chicago, Illinois has issued its new 1940 catalog.

The catalog contains over 200 pages. Because it involved considerable expense in preparing, they have adopted the policy of sending it out upon request only. These requests must be on a business letterhead, or contain a business card showing clearly a direct connection with the refrigeration or air conditioning industry.

In addition to the standard merchandise used generally thruout the trade many new features and all of the new, recently introduced products have been incorporated. A feature of the catalog is the list prices shown—enabling the service organization to show the catalog to its customers without revealing the actual net prices.



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Airo Supply Company, 2732 North Ashland Avenue, Chicago, Ill., announces the release of its new 1940 Catalog and Buyers' Guide of Refrigeration and Air Conditioning Parts, Tools, Supplies, and Shop Equipment.

Containing 96 pages of nationally advertised items, the new catalog features such well-known products as Brunner condensing units, Diamond Belts made by B. F. Goodrich Rubber Co., DuPont Refrigerants, Alco Valves, White-Rodgers Controls, Mueller Fittings, Peerless Coils, and many others. The new Airo Stoker is also introduced for the first time.

"No expense was spared to make this the most complete and attractive catalog ever issued by Airo Supply," says C. R. Markham, advertising manager for the company.

General Controls Co., 700 West Ivy St., Glendale, Calif., has issued a new 48 page catalog. In it, the entire line of pressure, flow and temperature controls manufactured by the company is illustrated and described. In addition, complete application, engineering and installation information is offered covering each item. Copies of the new catalog may be obtained free by writing the company.

A new branch of the company has been established at 687 Boylston Street, Boston, Massachusetts, with C. W. Marsh, sales engineer, in charge.

Superior Valve & Fitting Co., Pittsburgh, Pa., has issued a new catalog containing, according to K. M. Newcum, Vice-President and Sales Manager, information on the design, construction, application and servicing of "soft-seat" diaphragm packless valves, pressure cup globe valves, check valves, pressure relief valves, liquid indicators, manifolds, dryer-filters, filters, economizers (heat exchangers), rapid-chargers (refrigerant transfer systems), service tools and fittings.

Two pages are given to the lowside and highside application of economizers (heat exchangers) in which are included a capacity selection table and four sketches showing

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Automatic Expansion Valves (All Makes)	$1.25
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Large manufacturer of capacitors making a full line of replacements for every type motor, has openings for sales representatives on a liberal commission basis. In reply, please state territory you cover and companies you now represent. Address Box 107, REFRIGERATION SERVICE ENGINEER, 435 N. Waller Ave., Chicago, Ill.

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ALL IN GOOD CONDITION

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Specials on other household refrigerator units. Write for details.

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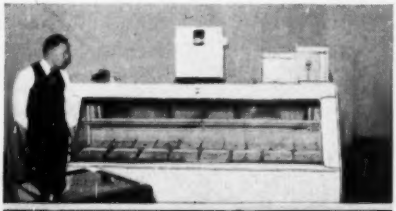
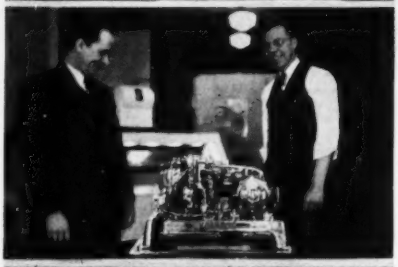
208 Lafayette St., N. Y. C.

diagrammatically the operation of a refrigeration system with and without heat exchangers.





Another Service Engineer gone "Sales minded" is Willis Stafford of Aurora, Ill., shown (top) admiring one of the display cases on his show room floor. Center—Willis with Floyd Duvall of Mills Novelty Co., looking over one of the Mills condensing units. Bottom—Willis has more office work to do now and is shown with his secretary wading through the morning mail.

A. WITTLIN WITH ROTARY

MR. ALBERT WITTLIN has joined the Rotary Seal organization. He has a background of eight years of practical experience in refrigeration service work and also several years at selling. In working for the Rotary Seal Company, he will spend most of his time in the field calling upon jobbers.

J. CARL WHITE PURCHASES R.S.D., PHOENIX

J. CARL WHITE announces that the business of Refrigeration Supplies Dis-

tributor has been purchased by the J. Carl White Co., Phoenix, Arizona.

The same personnel will represent the new company. It will be their policy to handle nationally approved lines of refrigeration parts and maintain a complete stock for immediate over-the-counter delivery.

S S S

WALKER TO MANAGE FEDDERS AIR CONDITIONING DIVISION

THE consolidation of all heating and air conditioning equipment into the Air Conditioning Division with E. R. Walker as manager is announced by the Fedders Manufacturing Co., Buffalo, New York.

E. R. WALKER

Prominent among the products of the Air Conditioning Division is the complete line of Type K Heating Coils recently announced. This Type K line, in addition to cooling coils, unit air conditioners and unit heaters, etc., provides a broad line for the trade.

S S S

BRASS & COPPER SALES FISH FRY

ON Friday, April 19, the Brass & Copper Sales Co., refrigeration and air conditioning supplies jobber of St. Louis, Mo., held a fish fry and beer luncheon using the very excellent smelts furnished through the courtesy of the Ansul Chemical Co., of Marinette, Wisc., manufacturers of refrigerants. Open house was held until about 8 P.M. by which time many pounds of this year's smelt run were consumed.

All of the guests were shown the new arrangement of the counter and stockroom.

MORE MONEY

FOR SERVICE MEN

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★ For over a year now our jobbers have supplied Herveen to service men all over the country. Many of these have written us and told of business which formerly they had been forced to turn down, now brought them increased profits, as well as enabling them to offer a more complete service. With Herveen you can now guarantee satisfaction to your Meter-Miser customers and do the job quickly and easily. Leading parts jobbers throughout the country now stock Herveen. If yours doesn't, write us direct.

HERVEEN

MODERN GAS CO., Inc.

Manufacturers and Refiners

1084 Bedford Avenue, Brooklyn, New York

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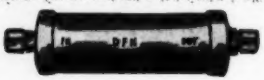
WHEN YOU NEED THEM



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